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A

TREATISE

ON THE

Physiology and Diseases

OF

THE EAR;

CONTAINING

A COMPARATIVE VIEW OF ITS STRUCTURE AND FUNCTIONS,

AND OF ITS

VARIOUS DISEASES,

ARRANGED ACCORDING TO THE

ANATOMY OF THE ORGAN, OR AS THEY AFFECT THE EXTERNAL, THE INTERMEDIATE, AND THE INTERNAL EAR.

SECOND EDITION,

WITH CONSIDERABLE ADDITIONS AND IMPROVEMENTS.

BY

JOHN HARRISON CURTIS, Esq.

Aurist to His Royal Highness the Prince Regent, His Royal Highness the Duke of Kent, their Royal Highnesses the Duke and Duchess of Gloucester, Surgeon to the Royal Dispensary for Diseases of the Ear, Lecturer on the Anatomy, Physiology, and Pathology of the Ear, Fellow of the Medical Society of London, &c. &c.

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1819.

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Curtis

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TO HIS

ROYAL HIGHNESS

THE PRINCE REGENT,

IN TOKEN OF THE

AUTHOR'S GRATEFUL SENSE

OF HIS

ROYAL HIGHNESS'S GRACIOUS CONDESCENSION,

IN BECOMING THE PATRON OF THE

Royal Dispensary for the Diseases of THE EAR,

AND IN

APPOINTING HIM

AURIST TO HIS ROYAL PERSON,

A SECOND AND IMPROVED EDITION OF

THIS WORK

Is most respectfully dedicated, by

His Royal Highness's

Most obedient and most

Devoted Servant,

John Harrison Curtis.

Soho Square,
March 10th, 1819.

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EXPLANATION OF THE PLATE.

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a. Hearing Trumpet.

b. French Artificial Ear, with gold tube; internal side.

c. French Artificial Ear, with gold tube; external side.

d. The Tubes.

e. Spanish Ears.

f. Internal part of the German Silver Ear.

g. External part of the German Silver Ear.

h. Trumpet Case.

INTRODUCTION.

The improvements in Medicine and Surgery of late years have been great and important, but more particularly in the latter. In proportion as civilization advances in every State, the number of diseases is augmented, and the profession acquires greater respect and estimation from its more extensive utility.

In former times, Surgery, the most ancient branch (for external accidents in savage life, always precede internal disease) was simple, and of limited extent. As improvement took place, this department became gradually enlarged ; and in point of science and principle,

as it is now cultivated, it stands on a firmer basis than Medicine. For the benefit of society, it has been subdivided, by its professors, into various departments, which, by calling for a more minute attention to particular subjects, has enlarged our views of them, and made us more capable of affording effectual relief, under circumstances formerly considered as beyond the reach of the Healing Art.

One circumstance that retarded the progress of surgery for some time, was the cultivation of anatomy by the early physicians ; as witness, the great and invaluable discovery of the immortal Harvey, in the circulation of the blood, which entirely changed the system of medicine at that time ; the discoveries also of Glisson and others of the earlier physicians tended to promote this end. The physicians presided at that period in the dissecting room, and of course took a lead in whatever regarded surgery, as well as medicine ; but the

increase of clinical practice to the physician, induced him, in time, to lay aside his attention to the dissecting room. As soon as that took place, it naturally fell into the hands of the surgeon, to whom it was at last solely consigned. The moment the surgeon acquired this pre-eminence, by the field of anatomy being left to himself; that moment, what was hitherto regarded as little better than a manual art, expanded in its turn into an extensive branch of science, and admitted divisions equally numerous and varied, as those which had hitherto been confined to the department of medicine.

The consequence of this has been that surgeons, anxious to improve that part of the profession assigned them, have, many of them of late years, limited their practice to certain portions, or to the diseases of particular organs, a circumstance which has been of the highest utility to the interests of the community. Though, on this point, surgeons have chosen to

be divided in opinion, it is more, perhaps, from self-interest, than from doubt of its utility; for every division clearly simplifies, and where a subject is extensive and complex, simplicity and perfection on any one point can never be obtained in any other way.

This minute division of surgery, first began with the diseases of the teeth, which certain individuals exclusively treated under the name of Dentists, and who form now a numerous and respectable body of practitioners.

It was next followed by others, in a similar exclusive attention to the diseases of the eye, under the name of Oculists, an organ which, from its nice structure and the delicacy and minuteness of its parts, requires both a skilful hand for the treatment of its diseases, and also an accurate and profound knowledge of its anatomy.

The perfection these branches have acquired,

is the best proof how appropriately this division has been made, from which the greatest public benefit has accrued: for the advantage which has resulted to mankind from the exercise of the Oculist's profession, as a distinct branch, is incalculable; the operations on that delicate organ, the eye, are now conducted with a nicety and success unknown in former times: the formation of an artificial pupil, as first invented by Mr. Gibson of Manchester, and subsequently improved by the late Mr. Saunders, and others, has saved the sight of numbers, on whom former operations had failed, and who, without this discovery, must have continued in total darkness for life.

The same happy result to society has been the consequence of the profession of the Dentist. The teeth are essential to the appearance and symmetry of the visage; without them that contour and harmony of features, which the face ought to possess, is wanting; but the teeth are

parts of the body which nature has intended should more quickly decay than the other parts, from their greater exposure to external causes, acting upon, and destroying their enamel, and osseous structure. When lost to the constitution, not only is the beauty of the countenance impaired, but the process of digestion becomes imperfectly carried on, the food is no longer comminuted as it ought to be, and stomach complaints, with a decay of general health, are too often the consequence.

The hand of the artist has here been the assistant of nature; the artificial substitutes are equal in their effect to the real organized productions originally implanted; nay, to such perfection has the art of man been carried, that in cases of certain complaints, where the palate or bony arch of the mouth has been destroyed, and the unhappy sufferer has been incapable of uttering and articulating, so nicely has mechanism supplied the defect, that no trace of it can

be perceived, either in the articulation, or in the reception of food.

These facts demonstrate clearly the advantage of subdividing the objects of professional pursuit or study, and bending a close attention to one point; it is applying to medical science, that which experience has proved to be so successful in the mechanical arts.*

If we take, for example, the construction of a watch, there are no less than twelve different and distinct departments in its manufacture, and it is only by each department having but one wheel or other appendage to do, that this useful article is brought to its great exactness, perfec-

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* This plan of subdividing its subjects has been long acted upon, also, in another liberal and scientific profession, the Law, with much advantage. The Counsellor who stands on the same footing as the Physician, often limits his practice to particular Courts. The inferior departments are extensively branched out into numerous divisions, to give clearness, perfection, and dispatch to the various and complex subjects, of which Law, as a branch of science, consists.

tion, and cheapness. The same plan is extended to all the leading branches of manufacture in this country, of which our manufacturing towns afford the most striking examples ; and it is a system, the utility of which has been strongly enforced and reasoned upon by the late celebrated Dr. Adam Smith, in his "Wealth of Nations." Indeed this subdivision and minute attention to one branch may be considered as the great safeguard of the manufactures of this country ; perfection and cheapness are united by it in a most eminent degree, which will stand against the rivalship of any other nation, till the same extent of population is employed as in this country, and of course the same perseverance to *one object ;* this is a fact which no reason can refute, and the *principle of it is interwoven* with *our very nature.*

The mind of man, it is clear, though capacious and possessed of very extensive powers, cannot embrace the whole circle of science, or retain it

with that exactness which is necessary to excel; he must select a part of the circle, if he wishes to shine, and must bend his attention to that subject alone, in scientific pursuits.* However, I do not intend, by this observation, to convey an idea, that the student should endeavour to get acquainted with the department he selects, only as a mechanical art, or that he should not travel beyond its bounds: on the contrary, a professional education should be so conducted, as to make every one first acquainted with the general principles and scope of every part of the profession; and this being once attained, and the general studies completed, *then*, and *not till then*, he should limit his pursuit to one subject; this subject, in consequence of his previous acquirements, he will then better un-

* Such was the opinion of a celebrated relative of the author, the late Mr. William Curtis, who, satisfied that no man can attend to two great objects at once, with equal success and improvement, gave up his medical pursuits for the study of Botany, in which he so eminently excelled; standing in so near a connexion to the author as uncle, he took an early interest in him, which he feels a particular satisfaction in thus acknowledging.

derstand; he will be able to improve it by a comparison and illustration of it with the other branches he has studied, and make them all bear on this favourite or leading topic: his previous acquirements may be thus considered in the light of scattered rays, which will be all brought home to this central point or focus.

The person who is wedded to one subject, acquires an intuitive knowledge from observation which cannot be conveyed by signs or even explained by words. It is like the amateur, who hearing a celebrated performer play on the violin, wished to make a purchase of his instrument; on purchasing it, however, he could not give it the same tones as its master; and when complaining to the latter of his cheating him, he archly replied, "Ah, you forgot, you should have purchased my fingers too."

In estimating the different senses, how important is the sense of hearing, to man; it is

the grand medium which connects him with society, and that extends information and intelligence far beyond what the eye, or any of the other senses can do. Through this medium he is enabled to conduct the great and complicated business of life. By it his harangue is heard in the senate, and his commands in the field. It forms the mutual and unembarrassed communication of all sentiment and expression.

The organ of voice, the most pre-eminent distinction of man, is even useless, unless its powers are excited through the agency of this sense; and where hearing is defective in early life, *dumbness* is generally the consequence.

A remarkable instance of the leading influence of this sense is recorded in the French Memoirs, and quoted by the Count de Buffon; where the want of hearing seemed even to prevent the very developement of the mind.

" A young man of the town of Chartes, about twenty-four, who had been deaf from his birth, began all at once to speak, to the astonishment of all who knew him.

" He informed his friends, that for three or four months before, he had heard the sound of bells; and that he was extremely surprised at this new and unknown sensation.

" Some time after, a kind of humour issued from his left ear, and then he heard distinctly with both. During these three or four months, he listened to every thing; and without attempting to speak aloud, he accustomed himself to utter softly the words spoken by others. He laboured hard in acquiring the pronunciation of words, and in learning the ideas annexed to them. At length, thinking himself qualified to break silence, he declared he could speak, though still imperfectly. Soon after he was interrogated by some able divines, concerning

his former condition. The principal questions turned upon God, the soul, and moral good and evil; but of these subjects he seemed to have not the *smallest* conception. Though he was born of Catholic parents, attended mass, was instructed to make the sign of the cross, and to assume all the external marks of devotion, he comprehended nothing of their real intention. He had formed no distinct idea of death, and existed purely in an animal state: wholly occupied with sensible objects, and with the few ideas he had acquired by the eye, he drew no conclusions from them. He did not want parts; but the understanding of a man, when deprived of the intercourse of society, has so little exercise or cultivation, that he never thinks but when sensible objects obtrude themselves on his mind. The great source of human ideas arises from the reciprocal intercourse of society."—Page 283, vol. 3.

Thus the defect of hearing appears to have

locked up, as it were, the mental and rational powers; a strong proof of the necessity of the intercourse of society, to give the mind its information and proper feeling, and to rouse its different energies. The same thing is confirmed by the account given of a savage boy found in the woods of Ardennes, in France, who for want of this social intercourse, which can only take place through the influence *of hearing*, possessed neither the powers of language, nor any other feelings or ideas beyond those of other animals.* An account of this case was

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* So successful has the author been in his practice, that he was induced to address the following letter to the Committee of Governors of the Asylum for the Deaf and Dumb, which received their thanks on the occasion. His object was that in addition to the consulting surgeon at present appointed to that establishment, there should be an attending surgeon or aurist, who should minutely examine every child offered for presentation, prior to their being admitted into the asylum, and report his opinion to the committee how far curable or otherwise.

Soho Square, Jan. 11, 1817.

GENTLEMEN,

IN presuming to address you on a subject which so materially interests the Institution for the Deaf and Dumb, your patronage of which does you so much credit, I beg leave to premise, that my object is not to interfere in the least with the present medical establishment; as I have the highest opinion of the

published some years ago, by Dr. Reid, of the Royal College of Physicians.

In estimating the value of the different senses, the best criterion to go by, is the opinion of

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professional talents, and deserved reputation of the medical officers you have been pleased to nominate: but these Gentlemen, I have no doubt, are too liberal in their sentiments, not to admit that the defect of being deaf and dumb, calls for an exclusive attention to these particular organs, greater than can be paid by any practitioner in general practice, however distinguished his abilities, or extensive his science, from wanting that *particular experience* which one *exclusively* confining himself to this department of surgery must possess.

In consequence of this, I beg leave most respectfully to suggest to your consideration, the advantage that would result to the Institution, were an aurist appointed to attend, and minutely examine the particular defect in each child admitted into your establishment; by this means an opportunity would be given of trying such methods as appear best calculated to give relief; and by this plan I conceive many of the objects of your laudable charity might probably be found curable, restored to society, and rendered useful; by which the bounds of your humane establishment would be extended, and greater scope given to your highly benevolent views.

I have the honour to be, Gentlemen,

With great respect,

Your most obedient humble servant,

JOHN HARRISON CURTIS.

To the Chairman and Committee for the Deaf and Dumb.

such persons who have been partially deprived of them.

A blind man, who has been for years in that state, when desired to make a choice whether he would prefer the restoration of sight, on condition of the loss of hearing, has been heard to say, that he considered himself happy, though blind, while he was able to converse with his friends.

Though this is in general the case, it is amazing, in some instances of early blindness, to what perfection hearing has arrived, with a view to supply the deficiency of the other sense.

The situation of the ear is more internal, and its powers more concentrated than those of the eye; its nervous expansion is more limited, and the bodies which act upon it are denser, and more solid than those of light; hence the sensa-

tions conveyed by it are limited, though more durable than those of the eye.

If experience and improved knowledge have shewn how much can be done to rectify the imperfections and diseases of the eye—the same experience, and the same ardent desire of improvement cannot fail to be equally successful in those of the *ear*.

But the ear, though the most important of all the senses, has hitherto claimed but little attention from the profession. The diseases of every other organ are well understood, together with the modes of repairing their defects; but the imperfections of this sense having been little attended to by the regular profession, the treatment has been, for the most part, confined to the hands of empirics; hence, obscurity and prejudice have prevailed in this branch of practice, and an apathy has taken place on the

subject, highly injurious to the interests of society.

It has been unfortunately laid down as a maxim, that the diseases of this organ are incurable. But this opinion has no just foundation; and, in fact, might have been applied with equal propriety to the other organs, on which we daily see such admirable cures performed. Indeed, there can be no doubt, but experience, joined with an ardent desire to improve, will be attended with the same success in this as in every other branch of medical science.

But to such a length has prejudice been carried on this subject, that in cases of deafness in early childhood, where much might have been done, and the misfortune of settled disease in a great measure averted, no attempt has even been made to ascertain the defect, or try the smallest means of relief, under the fallacious, and unfortunate idea for the sufferer, that he will out-

grow the disease, or that the organ will acquire an acuteness or increased powers as life advances, which it does not possess at that period.

No opinion deserves more to be condemned, or is more against the interest of society; there are indeed diseases of this nature, but they are of the constitutional class, and depend on a general fault of habit, they are not local, or affections of one part. Thus scrofula or king's evil, as puberty advances, and the system acquires greater tone and firmness from the changes which take place at that period, loses much of its virulence and morbid action; and, therefore, in a certain degree, the constitution may be said, as it acquires strength, to out-grow the disease; but even here it is found that unless medicine lend its aid, numerous victims would be lost, before the salutary time of life or out-growing era did arrive.

This popular prejudice may be considered as

one cause that impedes the progress of medicine, for it prevents patients applying to the practitioner on the commencement of a malady,—the idea of nature curing diseases in general, though proper to be entertained to a certain length by a professional character, should be opposed as a general opinion, from conveying a want of confidence in a science, which is justly considered as the most useful.

The diseases of the ear, like those of other parts, are often constitutional ; and the general treatment of the constitution will, therefore, influence the malady of the particular part. Thus a certain well known malady in its constitutional form and ultimate stage, attacks the ear, and deafness is produced by this specific cause.

The same course of medicines that remove other constitutional symptoms, has an equal effect on this organ ; and if there is no other constitutional symptom but deafness, then em-

ploying internal medicines, according to the regular method observed, will remove this complaint.

If the stomach also is the centre of sympathy to the whole machine, as generally admitted, there is no doubt that the proper attention to it, and that of the bowels, will do much to remove diseased action connected with accumulation; hence the antiphlogistic treatment succeeds even in cases of apparent weakness, by rousing and invigorating the action of these *primary organs*, which is soon extended to the rest of the system, and a full play given to the circulating and secreting powers.

Various other instances might be adduced, all tending to show that there are different morbid changes of this organ, as well as of the others, which are curable by a general treatment acting upon the constitution, and thus indirectly affecting the part.

Nay, even the most difficult of the whole of this class of diseases, that which is termed *nervous deafness*, may, as we find in its first stage, be arrested in its progress, and thus rendered curable.

It is curious to remark, that though the structure of the ear has occupied the attention of the most ancient anatomists and medical writers, little advantage has been derived from their researches in a practical point of view. We find in examining the early authors that Alcmeon in particular, an illustrious Crotonian philosopher, studied this organ: he lived shortly after the time of Hippocrates, who flourished 400 years before the birth of Christ. Aristotle frequently quotes the anatomical ideas of Alcmeon, and in Scaliger's edition of that author's works, the Stagyrite expressly devotes his time to confute the notions of Alcmeon. Aristotle himself treats the subject of this organ of sense more correctly, for we find him dividing the external ear into a

pars innominata and *lobus*, which he says are wholly composed of cartilage and flesh ; the inner part he likens to a shell, from which there is no passage into the brain, but one into the cavity of the mouth, meaning the tube which Eustachius took the credit of discovering. But without entering into a minute detail, it may be sufficient to observe, that the following is a numerous list of ancient authors who have all treated on the ear, though little advantage can now be derived from the perusal of what they have left us.

In Nemesius' work, who flourished, according to Mercurialis, in the times of Gratian and Theodosius, about 150 years after Galen, we learn he wrote on the senses, and in cap. x. *de Auditu*. Also Bernardus Gordonius may be consulted, p. 291 *de Aure*.—Bartholomæus Anglicus de v. sensibus in totidem capitibus.—Nicolaus Nicolus, Serm. 3, tract. primi, cap. v. *de Sensu Auditus*.—Johannes Matthæus de Gra-

dibus, *de Anatomia Auris*, c. 103.—Johannes Anglicus, otherwise Johannes de Gadisden, *de Anatomia Aurium*.—Likewise Alexander Achillinus; this author first gave the names of malleus and incus to the two bones in the ear, and Jacobus Berengarius, commonly called Carpus, also notices these two bones adjacent to the tympanum, which move, he says, by the percussion of the air, and thus occasion sound.—Nicolaus Massa likewise ascribes the discovery of these two bones to Achillinus, Vide Epist. 5.—Folius, Cassebohm, and Buchner, also wrote on the ear, but are authors of a more modern day.

From the ancients, when we revert to modern times, we have to remark with some regret that the published works on this subject are few in number, and are very incomplete. Duverney, among the French, is the only author who has treated the subject scientifically, until our own time, when Dr. Monro, of Edinburgh, first published his very accurate Treatise on the Anatomy

of the Ear; and was followed by the work of the late Mr. Saunders, which, besides the anatomy, elucidated the diseases of the ear, and introduced into this department of surgery considerable improvement. His work, however, is more adapted to the profession than for general reading; and as it is of importance that those who unfortunately labour under a defect of hearing, should have some knowledge of the particular causes of the disease, the Author flatters himself that the present Work will be found an acquisition of no small value to those for whom it is more *especially intended.*

The Work is necessarily concise; but any gentleman, desirous of further investigating this interesting subject, may have an opportunity of so doing, by attending the Lectures of the Author, and the practice of the Royal Dispensary.

TREATISE, &c.

CHAP. I.

Of the Structure and Uses of the different Parts of the Ear.

A HOLLOW cavern seems the general structure of the organ of hearing, as best fitted for receiving, and reflecting sound.

So necessary is this cavernous shape of the external ear to the reception of sound, that we are told the celebrated tyrant of Syracuse, Dionysius, caused a cavern to be formed in a rock, corresponding to the shape of the human ear, where he used to confine his state prisoners;

and from the strong vibration, and echoes of the sound, he was enabled to learn the secret conversations they held, and thus condemn or acquit them accordingly.

In the different tribes of animals, it is liable to considerable varieties in the appearance and manner of its formation, and in its appendages.

In man it is more perfect in its structure, than in any other animal; and it is, also, of more importance to him than to any other of the creation.

All animals, as far as we know, possess this sense; it was formerly doubted with respect to fishes. The organ of hearing in fishes, was first discovered by the late Mr. John Hunter, and is prosecuted at considerable length in his work on the organ of hearing in fishes, by the late Professor Monro, of Edinburgh. Thus the

modern researches and discoveries in comparative anatomy, have sufficiently established their possession of this sense, as well as the other classes.

The impressions the organ of hearing receives, are conveyed through the medium of air, which acquires from the action of the body communicating sound, a tremulous motion or vibration ; and as these motions or vibrations succeed each other, sound is impressed or directed to the thin membrane stretched obliquely across the auditory passage, named the tympanum, where it produces a similar motion, which latter motion carried on, excites a corresponding feeling in the mind.

That sound can only be conveyed through the medium of air, is fully confirmed by the experiments of the diving-bell ; for if a sonorous body is placed in it, as a bell for example, in consequence of its being exhausted of air, no

sound is produced, nor can the ringing of the bell be heard.

Though *hearing* is more perfect in man than in any other animal, it is not so at the period of birth; an infant hears at first very imperfectly, and only strong sounds; but this arises, in part, from the passage, or meatus externus, being covered with a viscid mucus, or discharge from the ceruminous glands of the ear, in a similar manner as the meconium fills up the intestines: on the removal of this layer or deposition, the sense soon appears perfect, but not so strong as at an after period of life. Indeed, as we find the meconium, with some children at birth possesses a morbid viscidity; so in the same manner the secretion most analogous to it will partake of a similar state, and may, therefore, be suspected where congenital deafness occurs by examining the state of the first passages, or *primæ viæ*.

In all animals, the ear is divided into an ex-

ternal and internal part, and the difference in the structure of the organ of hearing is greater in the external ear than in the internal.

In quadrupeds this difference of structure is more conspicuous than in the rest, and this difference or variety seems intended to adapt the animal the better for its particular circumstances or mode of life.

On examining the external ear in quadrupeds, it is found to resemble the oblique section of a cone, from near the apex to the base. Hares, and other animals exposed to danger, and liable to be attacked by man or beasts of prey, have large ears, and they are particularly directed backwards; while their eyes at the same time, full and prominent, warn them of any danger in front. Rapacious animals, on the contrary, have their ears placed directly forwards, as is observable in the lion, the tiger, the cat, and others. Where the peculiar nature

of animals is such as to require that sound be distinctly heard from a low situation, as, for instance, slow hounds and others, they will be found to have either large pendulous ears, or to have them flexible, since they move their heads with more difficulty than man.

Much advantage may be taken of this circumstance in the construction of mechanical contrivances for assisting hearing; some animals keep their head to the ground, as if impressing the sound more strongly on the organ; and in the case of deaf persons, such contrivances should be made nearly of a length to touch the ground, which would give ample compass for the reception and retention of sound.

Fowls, again, differ from quadrupeds in having no external ear; but in place of it there is a tuft of very fine feathers, which covers the passage to the ear; this covering allows the

sound to pass easily through ; and it also prevents any insects, or external matters which might prove a source of injury, from getting into it.

To fowls an external ear would have been inconvenient, as causing an obstruction in the course of their flight, in passing through thickets, and other nearly impervious places. In their auditory passage also there is situated a liquor to lubricate it, and from its disagreeable quality, to prevent the entrance of insects.

This secretion of the ceruminous glands in man, is of the first consequence to the organ of hearing, and should be always kept in view in judging of its diseases ; from the moment these glands are formed, even before birth, as may be seen on dissection, their secretion is poured out, and accordingly after birth an accumulation in the ear is a frequent source of deafness till removed ; it varies in quan-

tity in different individuals, according to habit of body and other circumstances, in the same manner as happens in the quantity of the other secretions, which, in a certain degree, are influenced by constitution, mode of life, and a variety of other causes ; it is a very frequent source of deafness, and in all cases should be strictly inquired into.

On examining the different tribes of animals, we find that fishes, as already noticed, have a complete organ of hearing, and equally perfect as that of the other classes. It is well known, that the ear of the Whale kind strongly resembles in its structure that of man. It has been examined minutely by Dr. Tyson and Dr. Cowper, and still more accurately by Professor Monro. A small round hole is the aperture to a long external opening, or meatus, which terminates in a concave membrana tympani, connected at the bottom with a chain of small bones, as in the human subject, and having also a cochlea, or

internal ear, with semicircular canals. The tympanum at the bottom is remarkably large, and communicates freely with the other cavities. There is also a tube, similar to the Eustachian one, which gradually enlarges as it reaches towards the tympanum. Thus, while the whale floats on the surface of the ocean, the several parts of his ear receive the same impression as that of man ; but to fit him peculiarly for his situation of occasionally diving deep, the external meatus is both small, and he has also the power of shutting it at pleasure, which is particularly conspicuous in the largest whales that possess a small hard body within the meatus, upwards of an inch in length, attached by its small end to one side of the passage, which serves as a valve to shut the ear when diving deep, and thus prevents over distension and rupture of the membrane of the tympanum : Nor is the ear in the skate less perfect than in the species of the whale. Two orifices at the upper and back part of the head present, which

are the external meatus, and form a passage into a sac or vestibule, which again communicates into a smaller one, and at the same place into a common canal. These sacs are filled with a soft cretaceous matter, and this matter seems to pervade every part of the internal ear, as necessary to render the impression complete. All these cavities are furnished with large nerves, larger in proportion than those in the human ear, and the only parts wanting here are the membrane of the drum and cavity of the tympanum, which were unnecessary when sound is conveyed through a different medium than air. Thus in them there is a vestibule and cochlea, corresponding to similar parts of the internal ear in man. There is also distributed upon these sacs, a part of the auditory nerve, resembling what is termed the *portio mollis*, or branch of the seventh pair of nerves, in the human subject: they have likewise semicircular canals, a leading part of the internal ear, filled with a fluid which communicates with these

sacs ; and they have also an external passage, which communicates with this internal part.

In the cod species, instead of this soft cretaceous substance, I have noticed, there is found a hard crustaceous stone ; but there seems no appearance of an external passage, as in the skate.

The whole organ seems to consist in them of three semicircular canals and a sac of considerable size, in which is lodged this crustaceous stone, and on it is expanded a considerable nerve, in a neat and elegant manner. A viscid humour, is likewise every where present, and seems essential for the purpose of hearing in this species of fish.

In prosecuting our inquiries farther, the ear has been discovered in insects ; it lies at the root of their antennæ, or feelers, and can be

distinctly seen in the lobster, and some others of the larger kind.

In the sea tortoise, the frog, and other amphibious animals, its structure is peculiar, by there being no external meatus, but an expanded Eustachian tube at the back part of the roof of the mouth, near where the under and upper jaws articulate. This tube has a winding course behind the upper jaw, and leads to a large cavity resembling the cavity of the human tympanum, covered by the skin of the temple and a tough substance. The latter then passes into the bottom of the tympanum, and next into a smaller cavity filled with a watery humour, and last it opens into a third cavity, having three semicircular canals, and a sac containing a soft cretaceous substance, on the membrane of which are distributed the nerves. Thus making a comparison of it with the human ear the tough substance or cartilaginous body supplies the small bones of our ear, and the membrane

to which it is connected is analogous to the membrane of the foramen ovale. The sac and semicircular canals and nerves exactly resemble the human labyrinth, or internal ear.

On the whole, the more we extend our examination of this organ of *hearing*, we shall find it so constructed, in every class, as to be peculiarly adapted to the mode of life, and other circumstances connected with the situation of the animal.

Man has the most perfect external ear of all animals ; as he must hear sounds equally from all quarters, and especially such sounds as are transmitted from his own height, so his external ear is both large, and placed in a vertical manner, turned somewhat forward. But to compensate the animal when compared with man, the former in general possesses, in this respect, a greater power of motion, and is furnished with a greater number of muscles. Thus

animals can direct or apply the cone of the ear to the sonorous body without moving the head.

When the motion of the external ear takes place in man, which has been known in some rare instances, it does not seem to add any thing to the perfection of the sense, as it does in them.

In describing the human ear, it is divided into three parts, the external ear, the intermediate, and the internal.

The external or outward ear is designed by nature to stand prominent, and to bear its proportion, in the symmetry of the head; but in Europe it is greatly flattened by the pressure of the dress. It consists of elastic cartilage, formed with different hollows, or sinuosities, all leading into each other, and finally terminating in the concha, or immediate opening into the tube of the ear. This form is admirably adapted for the reception of sound, for collecting

and retaining it, that it may not pass off, or be sent too rapidly to the seat of the impression.

The intermediate ear displays an irregular cavity, having a membrane stretched across its bottom; and this cavity has a communication with the external air, through the tube which leads into the fauces, or throat. The tympanum, or drum, which stretches across it, is intended to carry the vibrations of the atmosphere, collected by the outer ear, to the chain of bones which form a peculiar mechanism in the tympanum.

The internal ear may be considered as the actual seat of the organ: it consists of a nervous expansion of high sensibility, the sentient extremities of which are spread in every direction, and in the most minute manner, inosculating with each other, and forming plexus, all for the purpose of increasing sensation.

Here also the sound is collected and detained, which the mastoid cells and cochlea present. To this apparatus is added the presence of a fluid, contained in sacs and membranes; and as this fluid is in large quantity in some animals, there is no doubt it is intended as an additional means for forcing the impression; and the known influence of water, as a powerful medium, or conductor of sound, strengthens the idea. The internal ear of man, therefore, has all the variety of apparatus which is only partially present in the other classes of creation; and its perfection is best judged of, by considering the variety which the internal ear of other animals exhibits. The internal ear of some animals, we find, consists of little more than a sac of fluid, on which is expanded a small pulp of nerve; according to the situation of this cavity, as it lives in water alone, or is partly exposed to the air, so in the latter it has an external opening with the ear or otherwise.

All terrestrial animals possess an external opening leading to the internal ear. In fowls, the ear is more of a cartilaginous consistence than real bone. Hence any tremulous motion impressed on the air is communicated merely by the spring and elasticity of these cartilaginous parts, which do not require, in order to render the membrane of the ear tight, the same power or action of the muscles. In the internal ear the semicircular canals appear also very distinct, the same as in man. In all animals the internal ear is composed of a nervous expansion, contained in a hollow or cavity, and assisted in its impression by a sac and fluid also present there.

Hence of all species of deafness, that termed nervous, or which affects the delicate nervous expansion of the ear, is the most serious.

In consequence of the little success that has

attended the practice in nervous deafness, I have conceived in such constitutions the quantity of air admitted by the external ear is too great; and in order to produce an equal balance between it and that admitted by the mouth, or through the passage of the Eustachian tube, I have been induced, lately, to adopt successfully a new mode of practice, pursued on the Continent, which I shall have occasion to mention in a subsequent part of this Treatise.

Such being the structure necessary to the collection and reception of sound, the latter, it is observed, reaches the ear at equal distances, and in an equal time. The common velocity of sound is at the rate of 1142 feet in a second, or about 13 miles in a minute. The knowledge of the velocity of sound is of great use in determining the distance of objects, at sea; for if a ship fires a gun, the light of which is seen 20 seconds before the report is heard, then it is

known to be at the distance of 20 times 1142 feet, or about 4⅓ miles.

Sound is also transmitted with equal velocity when it traverses a large space, as when it pervades a smaller one, without any diminution. It is likewise transmitted with the same velocity by night as by day, and when the sky is serene, as when it is rainy or hazy. The degree of noise it produces has also no influence in altering the swiftness of sound, as it is equally quick from a cannon as from a smaller instrument. The velocity of it is, however, increased by the aid of the wind when pursuing its direction, and lessened when the wind is in an opposite quarter.

All sound is conveyed in waves or vibrations; and where these meet with an obstruction in their course, which is hard and of a regular surface, on striking against it, they become reflected. If the ear be placed in the course of

these reflected vibrations, it will perceive a sound similar to the original one, which will appear to proceed from a body situated in the same position and distance as the reflecting medium or obstacle, and exactly as the original sounding body was before.

This sound is properly termed an echo, or a reflecting one, thrown upon the ear by the obstructing body.

Reflected sounds, like reflected rays of light, may be deflected, that is, magnified or turned off, by contrivances similar in principle to those made to increase the powers and extent of vision. Thus, where there is an elliptical cavity, sound uttered in one focus or point of it will be heard much magnified in the other focus ; of this a striking example is given by the effect of sound in domes or vaults, as instanced in the Whispering Gallery of St. Paul's Cathedral. It is on this principle the speaking-

trumpet is constructed, so useful at sea ; which in its form is a hollow parabolic conoid, having a perforation at the top, to which the ear is applied in hearing, or the mouth in speaking. This principle of reflected sounds applies to the ear itself. From the hard bodies situated in the internal ear, the sound is evidently reflected back to the other parts, so that the organ may be said to combine both principles of receiving the impressions directly, and again indirectly, by the reflection of the sounds which strike on its harder or bony parts, thus applied a second time, as it were, to the anditory nerve. This idea is strengthened by the circular shape of the canals, where the sound striking on one focus will be magnified as it extends to the other, and in man they bear a larger proportion to the cochlea than in the quadruped or whale.

The same may be said in respect to the cochlea, and all the internal parts of the

organ, which are certainly formed for this reflection and reverberation of sound. Indeed, it is only by comparing the structure with the parts we know, that a just idea can be formed of the peculiar and intricate fabric we observe, as we cannot suppose any part of the mechanism is made in vain.

Besides the effect of the hard and bony parts of the ear in increasing the power of sound, the tension of the different membranes seems also an essential requisite. Thus various muscles are so situated as to put the parts on the stretch, that the sound striking upon them, like the parchment of a drum, may, from this tension, have its influence augmented.

In respect to its tension, the tympanum may be also compared, not unaptly, to the strings of a violin, or musical instrument, even more properly than to a drum; and as the state of tension and relaxation we find produce such a

variety of sound with this instrument, so in the same manner a variety of circumstances will equally affect the tension and relaxation of this part of the ear, and consequently vary its powers of impression.

Its four bones act mechanically, in consequence of the power of their muscles, which strike like the key of an instrument, and produce a percussion of sound on the tympanum.

The knowledge of reflected sounds has never yet been taken advantage of by the aurist, in applying the principle to the construction of artificial means for assisting the faculty of hearing; the only principle attended to has been, to increase the collection of sounds by extending the canal of the auricle or external ear, in the form of trumpets and cones: but if the farther power of reflected sound were admitted into these instruments, as I have now attempted to do, on the plan of the speaking-

trumpet, a two-fold advantage would arise, both in a greater collection of the vibrations, and in their more powerful and repeated application to the organ.*

Indeed, in constructing such instruments, the length we may observe is the great point; for as in mechanics the powers of the lever are increased by its length, so the strength of the impression conveyed by the air will be in proportion to the length, and also the straitness of the tube through which it is conveyed.

Besides the perfection attached to the structure of the human ear beyond that of other animals, its nervous texture internally is of a more delicate and sensible nature. Thus the

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* Besides this instrument, in order to give every possible assistance to deaf persons, the author has with much pains collected a variety of ingenious mechanical contrivances, from the Continent, on the principle of improvement, on some of which he has made important and useful alterations.

nerves are even more acute or sentient than in the other parts of the body. All the nerves of the internal ear display a soft pulpy substance, but are never seen in the form of a firm cord; and in the flexible and membranous parts, they shew even a change of colour. This change is like that the optic nerves undergo on entering the eyeball to form the retina, and the term retina or net-work, is here properly applied, from the reticulated appearance they display.

The auditory nerve also, as it enters the internal passage of the ear, is accompanied by a larger artery than most of the other nerves, to heighten the sensibility; for increased circulation has every where this effect; and it also forms into plexus, or combinations, for the same purpose.

Though the use of the Eustachian tube has been doubted, as conveying sound by the

mouth, yet a simple experiment will convince us, that it has *some* influence in this respect; thus if a deaf person is to converse with another, and a wire or other medium of communication is made to pass to the mouth of each, by placing its extremity between the teeth, the deaf person will hear the conversation better than without this assistance, which certainly proves that part of the vibrations of sound is carried along the wire into the mouth; and applied to the ear, through the Eustachian tube in the throat, while a part also reaches the ear externally, and is collected in the auricle in the usual manner: this fact is farther proved by deafness occurring from the obliteration of the passage of the Eustachian tube, in consequence of diseases in the throat, particularly in consequence of ulcerations from a well known specific cause. Besides, therefore, merely preserving the balance of air between the external and internal ear, it certainly has an influence also in conveying sound; and while the meatus

externus admits its application one way, the aperture of the Eustachian tube admits it, we may conclude, in a certain degree, the other, and may be considered as an accessary means to increase the impression, driving the vibrations of sound in different directions to one point; and hence also persons generally hear best with the mouth open, when the opening of the Eustachian tube is most expanded. The same thing has been observed of deaf persons, that they hear best when riding in a carriage, probably from the air being carried with stronger impressions to the ear.

Indeed, this opening between the ear and throat is one of great consequence, and one of which much advantage may be taken in the treatment of deafness; in nervous deafness, I am persuaded, too great a quantity of air, as I have stated, is often admitted to the ear, which appears from the confused noises complained of, when it does not act with sufficient energy

to allow the impression to be made. By lessening, therefore, the action of the air on the external passage, and making it pass more forcibly by the internal, I am satisfied, deafness may be cured.

When we examine next the nervous texture of the internal ear for receiving the impression, nature seems to have provided that the nerves, as I have observed, should be here more acute or sentient than elsewhere.

Nay, they often acquire a morbid acuteness without disease. This is particularly the case after childbed, and so acutely sensible is the organ in this state, that there are many instances of a sudden noise, producing syncope and immediate death ; while in such cases, on dissection, no traces of disease could be discovered, and therefore, that this extreme sensibility was the sole cause.

From the same cause of its acuteness or delicate feelings, its powers are also liable to suspension, and perhaps this is the state of it, in that deafness which often takes place after engagements, both by sea and land, when the tremendous noise acting upon it, exhausts and destroys its powers.

On proceeding farther into our examination, the nerves of the tympanum and other parts of the ear, where this exquisite sensibility is *not* so much required, display the natural texture as firm cords, and consequently a less sensible substance. All these circumstances shew that hearing, or the impression of sound to produce it, requires a higher degree of organization than the other senses, and a more complex mechanism.

In order to judge properly of the parts, more essential to the organ, we must take the assistance of the discoveries made by dissection.

With respect to the external ear in man, wherever it is completely removed, either by accident or design, deafness ensues, although its partial removal is not attended with this imperfection. The external ear, therefore, or something in its form to collect sound, is a necessary division of the organ.

When we proceed internally, we find that a partial *destruction* of the membrane of the tympanum is not accompanied with deafness; but its total removal is always so: this partial destruction is proved from persons being able to make the smoke of tobacco pass through the throat by confining the mouth and nose, in consequence of its entering the Eustachian tube, and thus going out of the external ear, which could never take place without an opening, or perforation of the membrane of the tympanum.

Ulcerations of the ear in childhood, have fre-

frequently this effect of destroying a part of the membrane of the tympanum, and yet the child, as he grows up, continues afterwards to hear without any perceptible inconvenience; yet, in order to hear with ease, it seems necessary that the membrane of the tympanum, even though partially destroyed, should always preserve a certain degree of tension.

For the membrane of the tympanum may be compared to the parchment of the drum, and is the medium by which sound is impressed on the organ, in the same manner as the beating of the parchment gives action and expression to that instrument.

In proof of this, cases of partial deafness are recorded where persons could only hear when a strong sound, such as that of a drum, was applied to the ear; and on dissection in one case of this kind, related in the French memoirs, no other cause appeared to produce

deafness, but a highly-relaxed state of the membrane.

Yet not only may the membrane of the tympanum be partially destroyed, and hearing preserved, but likewise the small bones of the tympanum have been in certain cases lost, or come away from ulceration, from a constitutional or other cause; but in such cases it appears the stapes was *always* left, and thus the openings of the fenestra ovata and rotunda, were preserved, which prevented the escape of sound from the labyrinth and internal parts! Where the stapes is removed by opening the internal ear, deafness must unavoidably ensue.

With respect to the Eustachian tube, its aperture into the throat seems indispensable to hearing, and wherever closed from malconformation or disease, deafness is a certain consequence. I already mentioned its obliteration happening in the throat from a particular dis-

ease; which is one strong reason for an early attention to such complaints;* but the same thing is apt to occur from a catarrh or common cold, when it is violent and long continued.

After considering the tympanum and Eustachian tube, I remarked in the internal ear, that the presence also of a fluid appears indispensable to the exercise of hearing. In all dissections of old persons who have been deaf for years, on examining the internal ear, it has been found totally dry, and wanting its secretion, or that fluid I before mentioned, contained in its sacs and membranes. Such a state occurs frequently from age, yet it may occur from particular circumstances; especially after fevers, of which deafness is often a consequence.

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* The poison of these complaints has a peculiar action on the nervous system, hence when the disease is latent in the habit, there is often a dullness and inaptitude of all the nerves, particularly those employed in the more active organs, to receive impression.

The air, I have endeavoured to shew, is the great medium through which sonorous bodies act on the ear. Its entire exclusion, I have already stated, prevents our hearing sound, however strong; and on the same principle, the condensation of air increases the force of sound in a proportion to the degree of condensation.

Water is likewise an equally effectual medium as air, and a bell rung under water is heard with equal distinctness as in the air; its effect is strongly conspicuous in cases of echos or reflected sounds, for where the sound has to pass over a lake or sheet of water, before it reaches the hard or obstructing body, it is much stronger than in another situation; a famous instance of this is well known to travellers, in the echo of Portici in Italy.

The well known experiments of Professor Monro on this subject, deserve here to be no-

ticed. He rung a bell under water at various distances, and found the transmission of sound equally distinct as through the air, and often stronger and graver.

From this general view, then, of the organ, the parts strictly essential to hearing are,—

First. An external ear;* for in man, whenever this part is completely removed, deafness is a consequence.

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* The external ear can only be considered as accessary in its functions to the internal; and it was conceived by the Count de Buffon, that hearing could take place without it. This he considered proved by the instances of dogs, and other animals, from the whim of their owners, being occasionally deprived of the external ear, and suffering no defect by the operation. But though this fact may be true in young animals, and while the expansion of the auditory nerve on the internal ear possesses its full powers and influence to receive the impression of sound, yet it is clear that in the human subject, such a loss would be severely felt; which is confirmed by the advantage of artificial means, in collecting the sound, and strengthening the power of impression.

Besides, in cutting the external ear in animals, part of the muscles still remains; and by a natural instinct, the animal acts with the remaining part with more energy, and applies it more eagerly and forcibly to the sonorous body, than before their partial removal, which entirely condemns Buffon's assertion.

Secondly. The membrane of the tympanum, which may be partially injured, but never can be completely removed, without producing deafness.

Thirdly. The stapes; for all the small bones of the ear may be removed without causing deafness; but the stapes is the only one that prevents the escape of sound from the internal ear.

Fourthly. The aperture of the Eustachian tube, as preserving the access of air through the throat to the tympanum, and its renewal and change in the organ; and that this is a necessary and essential part, is evident from the structure of the ear in the tortoise and frogs, which have no external ear, but an enlarged Eustachian tube placed at the back part of the roof of the mouth.

Fifthly. The presence of a fluid in the in-

ternal ear, which is necessary to heighten the acuteness of impression, and to render it effectual.

But it remains next to observe in what manner the impression on these parts comes to be made, or the tremor from sonorous bodies communicated to the nerves of the internal ear. In man, quadrupeds, and birds, besides the impression communicated to the nerves of the ear by the whole bones of the head, a distinct impression may be conveyed to them in three different ways :—

1. By the structure of the parts regulated by their muscles, which connect the membrane of the drum with that of the oval hole.

2. By the action of the air contained in the cavity of the tympanum, which air must communicate its tremor in two ways—by motion from the membrane of the tympanum, and

also by tremor of the external air communicated to the membrane of the Eustachian tube, and

3. By the medium of a watery liquor filling the cavities of the vestibule, semicircular canals, and cochlea, which transmits the tremor from the membrane of the oval and round holes to the portio mollis, or nerve of the internal ear.

Such, as I have endeavoured to describe it, is the complex and minute structure of this important sense; and when we attend to the intricacy of its parts, to the delicacy of its texture, and to the numerous windings and sinuosities it every where displays, we are struck with wonder and admiration at the nicety of its mechanism, and cannot be surprised that the least change should produce on it a deviation from the healthy state.

Nay, when we farther contemplate the varied

organization of the ear in the different tribes of animals, we shall in all of them find it admirably fitted for their different situations and characters; and by a slight comparison of the different tribes, we shall understand the reason for its apparent difference of structure in each. Thus the whale, though he would seem amphibious, has the same formation of heart and lungs as man, and is therefore obliged to breathe frequently and regularly, and thus to live chiefly on the surface of the ocean. Hence his ear is constructed to receive sound from the air by an external meatus.

But in the real amphibious tribe, when part only of the blood passes through the lungs, and which possess the power of breathing arbitrarily, or of plunging under water and ceasing from breathing for a length of time, the ear is so adapted as to receive the first impression either from the air or from the water; for by means of an expanded Eustachian tube air is

introduced into the cavity of the tympanum when they breathe, and through it also the impression is conveyed from the atmosphere, to which their ears are generally exposed, to the bottom of the ear with more force than it would have been by the medium of a watery fluid passed into the cavity of the tympanum.

In fishes, both living and breathing in water, not only is the impression of sound on the surface of the ear transmitted, but is conveyed also by the same medium to the bottom of the ear. Hence it is that they stand in no need for a cavity of the tympanum or for a Eustachian tube.

Semicircular canals are conspicuous at the bottom of the ear in all fishes, similar in shape and situation to those in quadrupeds, but they are much larger and more extensive in their surface, in order to compensate for the less forcible impression made by the water on them than in man and quadrupeds by the air.

Along with these semicircular canals there are also sacs, which resemble the cochlea in men, and answer for it in the same manner as a short straight tube does in birds. The stones or hard bodies in the ear of fishes also serve as the bones in the human ear to render the impression more forcible on the nerves that are spread on the membranes that contain them. In several fishes also which have an external ear, the sound is conveyed by a watery viscid liquor to the semicircular canals and sac containing the cretaceous or stony matter.

Thus, the more we contemplate the varied structure of this sense, the more we shall be convinced it is the work of infinite power, and modified by a Supreme Being, who has adapted every creature, whether animate or inanimate, for its place. All our researches in anatomy serve to point out this fact, but none more strongly than the investigation of the different organs of sense. A nervous expansion we find the

universal medium, on which the impressions are made, and through which they are conveyed. This being the case, all the senses may be considered in a manner as resembling each other, and only differing in their peculiar modification, or what may be termed the auxilary organization of the parts that transmit the effect to the mind.

CHAP. II.

Of the Diseases of the Ear.

Having in the Introductory Part pointed out the necessity of an exclusive attention to the diseases of the Ear as a particular profession, and the parts of the organ essential to the exercise of its peculiar functions ; I now proceed to examine its leading diseases, or those imperfections which either impair, or produce a total loss of hearing. For more clearly understanding their nature, they require to be arranged according to the particular parts of the organ in which they are seated; and they accordingly come to be divided into the diseases

of the auricle, or external ear; diseases of the tympanum, or drum; and diseases of the labyrinth, or internal ear.

Diseases of the External Ear.

The diseases of the external ear, like those of every other part, partake of the nature of its structure, and as this is neither important, complex, nor extensive, these necessarily become in a manner simple and confined; indeed, as a cartilaginous basis with a cutaneous envelope, the external ear is subject to the same affections as other exterior parts. The chief of which that require the more particular attention of the aurist, are inflammation and that herpetic eruption which occurs so frequently in children.

I. *Of Inflammation.*

On such a topic as inflammation it it difficult to advance any thing new, therefore I have

merely collated those symptoms which my own experience have verified.

The invariable effect of inflammation is to enlarge the bulk of the part it attacks, and when this happens to be of a solid structure that does not readily yield to the distension, the attending inflammation is thereby aggravated. This is what happens in the disease we are treating of: in consequence of the dense nature of cartilage the pain is vehement and excruciating, and fever is the usual consequence of such painful excitement.

Regarding the cure of this affection, the *methodus medendi* differs in nothing from that found effective in other inflammations. If the attack be slight, a cooling lotion kept constantly applied to the part, low diet and saline purgatives are the most proper remedies; but where the disease is more acute, leeches must be applied to the inflamed organ, and in order

to procure an abatement of pain, an anodyne draught may be administered at bed-time.

The success of resolution is known by the gradual abatement of pain; but should the preceding means fail in their influence, then suppuration must be promoted, and the former plan laid aside, substituting in its stead, warm applications and poultices to the ear; but in some constitutions, it may be observed, so rapid is the process of inflammation in this part, that suppuration is unavoidable.

My own experience confirms the remark of an excellent writer, to wit, that when suppuration occurs, the pus is generally vacated between the auricle and mastoid process of the temporal bone; or into the meatus auris. In the first instance the abscess heals without much difficulty from the ready exit the matter finds, but in the latter case the aperture by which it escapes into the meatus is sometimes

so contracted, that the pus accumulates and keeps up a source of painful excitement. The contact of matter also in the contiguity of a bone is apt to occasion caries, and consequent exfoliation, hence it becomes a part of our serious regard to prevent such occurrences; in order to which, a free opening must be made into the sinus and its orifice enlarged, or what perhaps is better, let the point of a lancet be thrust into the abscess behind the ear, the dependent situation of which will permit the easy discharge of the matter as soon as it is secreted.

The time of teething in young children, is the period when this disease is most apt to occur; and hence its acuteness may be accounted for, requiring often the palliative powers of opium to lull the intense pain it occasions. It is a disease more frequent in scrophulous subjects than others, and thus the propriety of early resolution, or subduing inflammation, is pointed out.

II. *Herpes.*

Another disease of the auricle, more frequent than the former, is herpes. This consists in a vesicular eruption set upon an inflamed base. Usually from the situation of the part affected, and the handling thereof, the vesicles are broken, a copious fœtid discharge takes place, and a troublesome and tedious ulceration ensues; this, when it has continued for some time, induces a thickening of the cutis covering the external ear and lining the passage, and which, together with the inspissation of the discharge in the meatus, so narrows the entrance that a temporary deafness is produced, from the obstruction offered to the free ingress of sound to the tympanum.

In the treatment, though the correcting of constitutional acrimony be the principle, the state of the part at the same time requires a primary attention. The inspissated matter is

to be removed by properly syringing the passage with soap and water, and, to do it completely, the choice of a syringe is a matter of consequence. A syringe of a moderate size will answer the purpose best, the power of which is not too great; and the operation should never be trusted to any but a skilful hand. On properly cleansing the ear, an alterative injection is to be employed instead of the soap and water, and the constitution corrected by alterative medicines in small doses, until the cure is completed.

The period for a cure may extend from two or three weeks to the same number of months, according to the circumstances of the case, in respect to its severity and constitutional nature; and this treatment should be continued in a regular and steady manner in order to be successful.

III. *Morbid Septum of the Passage.*

Congenital malformations occur occasionally in new-born infants, and to such a degree as to deserve the appellation of monstrosities. Less degrees of this preternatural occurrence, being of minor importance, are not usually thus designated: of this nature are septa where apertures ought to be. These occur in various openings, and at times are discovered in the external ear. A septum is found to extend across the meatus, and necessarily excludes the vibration of sound on the tympanum from without; hence deafness is the natural consequence. This extraneous formation is also the effect of disease, and is, though seldom, the sequence of the ulcerative process. This defect more frequently arises from a diseased tympanum, than from any other cause, where the suppuration is considerable, and much matter has been forced out into the passage.

The following is the usual progress of the disease:—The patient, after a puriform discharge from the ear, feels a sudden and considerable increase of deafness, to which he has been in a certain degree subject in consequence of the original complaint. During this original state of deafness, he has been also sensible, on blowing his nose, of air passing at times through the meatus; but the puriform discharge having now ceased, and the patient being also no longer able, on blowing the nose, to feel air escape through the passage, the existence of a septum becomes undoubted. To this may be added the sensation of a particular fulness of the tympanum.

If, under these circumstances, the patient be placed in a clear light, and the ear examined, a septum will be perceived. To remove this impediment, the septum is to be pierced and lacerated; when the hearing will be restored to the same degree in which it prevailed under

the diseased tympanum, and before the septum was formed.

So quick is the hearing restored, that, immediately after the operation, the ticking of a watch has been heard at a considerable distance, which could not have been perceived before, even when close to the ear.

After the operation, much attention is necessary to prevent the closing of the sides of the aperture, and the septum being re-produced.

IV. *Of Polypi of the Ear.*

All secreting surfaces are liable to excrescences. They are found in the uterus, but their most common seat is in the mucous membrane lining the cavernous structure of the nose. In like manner the meatus of the external ear is subject to excrescences: these are usually the consequence, in the latter instance, of a diseased

tympanum, and they are rarely met with except in this source. They have been aptly compared to syphilitic warts, and like these they are generated from irritation.

The treatment to remove these polypi is the same as that employed for excrescences elsewhere: when small they are best extracted with a pair of forceps, and the root or part, to which they adhered, afterwards touched with the argentum nitratum, or lunar caustic. In introducing the caustic, care must be taken not to carry it so far as to injure the tympanum ; and with this caution the treatment will be generally successful.

Where the polypus is appended to a small ceruix or neck, a ligature is the preferable mode of removing it. The operation also is less alarming to the patient, and at the same time equally effectual as the forceps or knife.

V. *Inspissated Cerumen.*

The most frequent cause of deafness, connected with the state of the external passage, is that arising from collected cerumen or wax ; a due secretion of the passage is absolutely necessary to keep it in a healthy condition, as well as to preserve it from external injury. A defective, or too profuse, secretion is equally the cause of deafness, and the cerumen frequently becomes indurated and inspissated to such a degree as to cause obstinate dullness of hearing.

The natural secretion of the ear varies in different individuals. In some it is copious, in others sparing in quantity ; how it is excreted has puzzled physiologists to explain, and the usually received opinion is that the fresh secretion propels the older, and that this is assisted by the occasional dependent position of the ear. Were it for me to add another, and perhaps

more powerful, expelling force to the above, it would be that of the action of manducation. Any one may convince himself of this power by putting his finger into his ear and imitate the act of mastication. Nature never made a function but she made it perfect, and in the present example we have an happy, though subsidiary, instance of her ingenuity—where the the same act that *receives* and prepares the food, is at the same time *expelling* the cerumen from the ear.

It has often surprised me to witness how small a portion of hardened wax will occasion deafness, for it is the induration and not the quantity of wax which occasions deafness: this when accumulated on the membrane of the tympanum, of course, interferes with the vibrations of that membrane, and when large in quantity it wholly obstructs the passage.

The symptoms that particularly mark this

complaint are the following. With the general sense of deafness, there is combined the impression of noises in the ear, consisting either of a particular confused sound, or a heavy sensation like the noise of a hammer: these sounds prevail most while eating.

On ascertaining the presence of these symptoms, and following it up by an examination of the ear, the cause of deafness will be easily detected.

The best means of relief is simply washing out the passage with warm water, by means of a syringe, which Dr. Haygarth found the best solven of ear-wax, and the only means necessary.

On its removal, the complaint is instantaneously relieved, and the hearing restored. When there is no defect or imperfection of the organ, its removal generally produces a slight irritation of the ear, in consequence of the

strong excitement occasioned by forcing the fluid into the passage; but this soon ceases, without any unpleasant effect. This disease, however simple, has been often mistaken or overlooked, and the cause supposed to lie deep in the structure of the organ, whilst, in fact, it arose merely from the source above pointed out; which shows the necessity, in all cases of deafness, of ascertaining, by an accurate examination, whether such a mechanical cause does exist.

VI. *Accidents.*

From its situation the external passage is subject to occasional accidents, or other mechanical causes acting upon it, than inspissated cerumen.

Thus, in cases of children, small bodies, as peas, cherry-stones, pins, &c. have got into the ear, where, exciting inflammation, they often

occasion considerable pain before they are removed. A number of remarkable cases of such accidents will be found related by authors, and one in particular, related by Hildanus, where a bead or ball of glass lodged in the passage and produced delirium.

The great art in extracting them, is to be cautious not to push them deeper; they are best taken out by a pair of small forceps, and a little oil may be dropped into the ear before making the attempt.

In the same way, insects at times get into the ear, which produce the most unpleasant feelings in the part, as well as great noise, and often actual pain; the best way of removing them is to drown them, by filling the passage with mild fluids, as water or oil, by means of a syringe, and thus washing them out. Acrid liquors are improper; for, in the endeavour to avoid them, the insect gets deeper. The motion is often so

severely felt by children, as to produce a state little short of delirium; after the removal, a little oil of sweet almonds is the best application, to soothe the irritated part. Even a little oil, in the first instance, will destroy the insect.

VII. *Congenital Inspissation of Cerumen.*

This is a disease more frequent than is generally supposed. All the secreting passages in children, at birth, are lined with a tenacious layer of this natural secretion; it is seen in the bowels, in the state of meconium; and no less in the ears, in the state of viscid wax: the reason of this is, that the parts of the concha and passage are narrow, and such an accumulation is essential to defend the tympanum from the waters of the amnios.

In all apparent deafness of children, the ears should be examined in order to trace whether it is connected with this cause.

CHAP. III.

Diseases of the Tympanum.

I. *Puriform Discharge of the Tympanum.*

The first disease of the tympanum is that named, from its leading symptom, its "Puriform Discharge," which has been acurately and minutely described by Mr. Saunders. Indeed, his account so precisely concurs with what I have had so many opportunities of confirming, that I shall take his description of its nature, progress, and effects, as my guide.

The discharge which issues from the ear is

thin and ichrous, and its nature is so virulent as slightly to corrode a silver probe; this it stains with a yellow colour, and it is occasionally tinged with blood, from the effects of corrosive ulceration which is going on in the interior. The hearing naturally becomes impaired from the injury produced by the disease, and in many cases it is wholly lost.

The leading criterion that marks the existence of this disease is the passage of air, on blowing the nose, by the meatus externus: this of course never can occur, but where there is a perforation in the membrana tympani. But this, although a pretty constant symptom, must not be looked upon as an absolutely necessary characteristic, for where the inflammation that induced the suppuration has first of all obstructed the Eustachian tube, this consequently shuts up all communication between the mouth and external meatus, even though the membrane of the tympanum be pervious and ulcerated.

When, therefore, the air passes out of the external ear, accompanied with a puriform discharge, we can no longer doubt of the nature of the complaint; still, as this criterion may be wanting, from the cause we have noticed, it becomes incumbent on us that we examine the ear itself.

In order to do this, let the patient's head be turned towards a good light on the side diseased, so as to permit the rays of light to fall on the bottom of the meatus externus, when we shall be enabled to perceive the part morbidly disorganized, and thus determine the nature and extent of the injury; or where from some cause ocular demonstration is unattainable, a probe being inserted into the ear and passed down to the membrana tympani, the peculiar feel which this communicates, if sound or otherwise, will ascertain the extent and progress of the disease. But this requires the *tactus eruditus*, or touch of experience, which nothing except practice can give.

The diagnosis of this disease is simple, and unless it be for the herpetic affection before mentioned, it cannot well be confounded with any other. This is a matter of some importance, since in the one we may almost invariably promise a complete cure, whereas in the latter caution must be used in pronouncing any such favourable prognosis.

This affection of the tympanum is produced by various causes; diseases of the throat are the most frequent. Thus the Scarlatina Maligna, or Scarlet Fever, combined with an affection of the throat, frequently occasions the tympanum to suffer, in consequence of the gangrene, or sloughing, which takes place: even the bones of the internal ear are at times thrown off; and the patient, if he survives the fever, is left completely deaf.

The disease, also, often succeeds the ear-ache, or inflammation of the passage extending to

the tympanum ; and if the inflammation is not subdued by resolution, then the tympanum and mastoid cells become filled with pus, or matter.

The pus comes to be discharged by ulceration, in large quantity, after the patient has suffered most intense pain. During its progress, the discharge of matter produces, for a time, a relief of symptoms ; but, as the disease goes on, fresh matter is formed, and continues to ooze from the passage.

The symptoms that peculiarly mark this disease are, an intense throbbing pain in the ear and head, accompanied with symptomatic fever ; and sometimes slight delirium supervenes.

The pain is not always equally intense, but fluctuates in degree ; and its paroxysms, or fits, are somewhat like those of the tooth-ache.

It is this resemblance to the latter that has caused it too often to be neglected, or improperly treated. It is a disease that evidently requires the most active antiphlogistic treatment; and nothing stimulant, either in the way of general and topical means, should be employed. Hence acrid substances, and stimulating fluids, used under the idea of curing the tooth-ache, aggravate, to a certainty, this disease; and suppuration, the very circumstance to be avoided, is hereby hastened.

The treatment to be observed here is obvious: to arrest inflammation in the first instance, if early applied to; and if this be done with energy at the first, all the symptoms will be found to subside. The deafness, which is always great during the inflammation, will gradually lessen, and the deposited lymph, instead of forming pus, will soon be absorbed. But if the inflammation has continued for some time, even though the resolution be accomplished,

the patient does not always recover his perfect hearing; and the question is,—how far a proper secondary treatment may obviate this imperfect state, which the previous inflammation has left? The defect here chiefly arises from a deposition of lymph, and perhaps, also, from some thickening of the parts.

We know that, in other parts of the body, a large quantity of lymph can be absorbed by using the proper means for giving activity to the vessels. As the deafness, after inflammation of the tympanum, arises from this cause, the object is to prevent the lymph from becoming organized, and any thickening of the membrane from becoming permanent, which must continue the defect. The point, therefore, should be, even if suppuration is formed, to make an early opening to evacuate the matter, and thus prevent the membrane from acquiring that state which renders it unfit for receiving acutely the impression of sound. An opening

being once made, and the matter discharged, every precaution must be next taken to prevent it from again forming.

But in a vast number of cases of this disease, the attack is slow and insidious, so that at first we are not aware of its commencement:—slight fits of pain are felt, and relieved by a trifling discharge; these fits recur at intervals, and it is not till after a long time that the puriform discharge is fully confirmed.

This disease has divided the opinions of practitioners: by some it is considered as only trivial; by others, as certainly dangerous; and, indeed, any one who regards its consequences on the organ of hearing, must be of the latter opinion. Its progress is rarely stopped, if left to itself, till the organization of the tympanum is destroyed, as well as its contents, or the small bones; when total deafness ensues.

Hence the most judicious treatment is required to arrest its progress; and this treatment is, at the same time, attended with no danger: those, therefore, who think that no interference should take place, I conceive, are highly to be blamed.

They consider it rather as a salutary discharge, which ought not to be interrupted; but the same argument applies to the healing of every sore, and is a relic of the obsolete pathology of former days.

This doctrine, however, is still held out by many respectable practitioners; but it rests on no solid or just foundation: and in all cases of this disease we are called upon to interfere as early as possible, if we wish to preserve the functions of the organ. Of this prejudice Mr. Saunders, to whom we are indebted for the first clear and judicious account of this disease, gives us some strong instances.

Even the late Dr. Heberden, in his Commentaries, had taken up this popular but mistaken opinion, that it ought not to be healed.

Some of the first surgeons and anatomists, also, have adopted the same idea, on the supposition that the discharge being suppressed, inflammation of the brain might be the consequence. That, however, is more likely to happen from the progress of the disease passing on to ulcerate the parts, and destroy the bone; which ulceration may thus spread to the dura mater, one of the membranes of the brain. But Nature has so provided, that as ulceration proceeds the membranes generally thicken, as a safeguard in some measure to check its progress.

In order to convey an accurate idea of this disease, it may properly be divided into three stages.

The first consists of a simple puriform dis-

charge. The second, is when it is complicated with fungus and polypus. And the third, is when a caries of the tympanum attends the discharge.

The progress of the disease is uncertain: at one time it advances rapidly through its different stages; at another, it requires years to make any considerable progress. It is evidently not a constitutional disease, but merely an affection of the part, and, as such, is only to be attacked by local means; for general remedies are of no avail. Where the constitution is weakly and infirm, it may be put into a more vigorous state, by the use of tonic medicines, such as bark and other astringents, which will certainly tend to quicken the healing of the parts. But, at the same time, direct applications to the seat of the disease are to be considered as the true means of cure.

Blisters and setons are here, with many surgeons, favourite remedies: they may, indeed,

act as auxiliaries, on the principle of derivation; but they ought to be judiciously used, and confined to habits that can bear such a drain; for if employed indiscriminately, and without attention to this circumstance, the patient may be subjected, for a length of time, to pain and inconvenience, without in any degree promoting the cure.

This disease, I have already stated, is attended with various degrees of deafness, and thus, in like manner, will the degree of recovery be found to vary. The extent of deafness, during the disease, is not always according to the apparent injury which the tympanum seems to have suffered: for in some cases the deafness is trivial, where the injury of structure is apparently great; and in others, the deafness is complete where injury appears to be but small.

In the first stage, the inflammation and thickening of parts will evidently obstruct the pas-

sage of sound between the external and internal ear.

In the second stage, the mechanical obstruction of a fungus, or polypus, must still more oppose the entrance of sound, and increase the degree of deafness.

On the suppression of the discharge, in the first or second stage, there is often a remarkable increase of deafness.

Of the real state of the parts it is impossible *à priori* to decide, as from their situation they are invisible; and it would be rash to determine how far the power of hearing is to be restored, or to flatter the patient with delusive expectations; but, whatever the state of the case may be, for the strong reasons already laid down, I conceive it always proper to make an attempt at a cure; the patient cannot be injured by it, and there is always a chance of doing some-

thing in the way of relief, if the disease be not advanced to its last and ultimate stage.

Where the discharge has continued, it forms in part a medium for the transmission of sound; and, therefore, though offensive in the last stage, the hearing will be still more diminished if it be partially suppressed: thus patients in this state, after syringeing their ears, hear better for a time, in consequence of the fluid acting as a temporary medium for the transmission of sound.

Though in very old cases cures may be performed, yet it is to recent ones chiefly that the Aurist is to look for success; but, owing to popular prejudice, the malady is too often slighted or temporised with; and hence it is generally in confirmed cases only that he is consulted: for in the early period of the disease, when relief may be obtained, it is commonly neglected, till, tired out with the fruitless ex-

pectation of nature curing herself, the patient has at last recourse to advice.

No complaint, perhaps, requires greater attention in training it through its different stages, and in varying the treatment of the disease according to these stages. No one remedy is to be trusted to; but the circumstance of each individual case should be studied before any particular method is adopted.

The first stage of the disease will often yield to an injection of the zinci sulphas, or sulphate of zinc, used night and morning, which will often effect a cure in the space of three weeks or a month. It is apt, however, to leave a morbid sensibility of the ear, which occasions pain on the entrance of loud sounds. The plumbi superacetas, or sugar of lead, is equally useful as an injection.

In some cases the continuance of these injec-

tions has been necessary for a considerable time; which it may be proper to state in order: first, that the patient may not look for a speedy cure; and, secondly, that he may be induced to persevere a reasonable length of time.

In the second stage of the disease, the point is to extract the fungus, or polypus, with a pair of small forceps; and, if these excrescences do not come entirely away, to endeavour to pinch the roots till the whole is removed. The roots may then be touched with the argentum nitratum, as before mentioned.

On the removal of the fungus, or polypus, the injection of zinc is to be used; and in a great number of cases the hearing will be restored, and the discharge suppressed.

When the fungus, or polypus, is removed, the morbid state is then reduced to the same as I mentioned in the first stage.

In all cases of this disease where a cure is completed, the healing process seems to be effected by the extension of the cutis, or skin of the meatus, into the tympanum, and its becoming continuous with the membraneous lining.

This fact is confirmed by dissection in several cases of the disease, where such a continuation clearly appeared.

After a cure, as a free passage of the air takes place, it occasions a drying of the thinner or watery parts of the discharge; the remainder accordingly becomes inspissated, and is the cause of occasional increase of deafness: but though this be the case, if a practitioner, when consulted, ascertains that there has been a previous discharge, he should be extremely cautious of employing any forcible means to remove it, lest he should endanger the re-production of the former disease.

II. *Obstruction of the Eustachian Tube, requiring perforation of the Tympanum.*

From its puriform discharge, the next affection of the tympanum I have to consider, is the influence produced on it by the obstruction of the Eustachian tube.

By this obstruction a very great degree of deafness is produced, and air can no longer be admitted into the cavity of the tympanum, while the included portion of air is either absorbed or else it remains.

If it remain, it becomes condensed, and counterbalances the pulses of air excited by sounding bodies; if it be absorbed, the membrane of the tympanum is carried by the pressure of the atmosphere as far as its limits can go, and in this case cannot vibrate, as it ought, to any considerable degree. That this last opinion is the most just, is confirmed by dissection, which

has shown the tympanum in a number of cases filled entirely with mucus, and consequently, that the air had been absorbed.

The cause of the obstruction of the Eustachian tube, as before stated, is either syphilitic ulcers, or sloughing from the cynanche maligna, or putrid sore-throat.

It is on the healing of the ulcers that deafness ensues; for then the obstruction becomes complete, and the opening into the throat is as it were sealed up: besides these causes, a polypus, or one depending from the pharynx, has occasionally produced the same obstruction; and an enlargement of the tonsils, where it continues, as in some cases, permanent, has been attended with the same effect.

This species of deafness is attended with no peculiar or diagnostic symptom to mark it, except the actual loss of hearing. There are

neither distressing noises in the ear, nor any of those other sensations which indicate a diseased state of the auditory nerve, or certain morbid causes acting upon it.

The true criterion to distinguish this is, that some conspicuous disease of the throat always precedes it; and, therefore, the previous history from the patient is of great consequence in ascertaining it.

On examining the parts in this case by dissection, I have found that the obstruction lies in the cartilaginous extremity of the tube. There are instances, however, where the obstruction depends on an increasing or superabundant ossification, filling up the substance of the bone.

In such cases the disease is slow in its progress, different from the former, and at the same time shows no obvious cause.

Though this species of deafness is highly formidable, yet the cure of it has been in many instances accomplished, by means of an operation first suggested, and successfully performed by Mr. Astley Cooper: to this he was naturally led by the important observation, that the sense of hearing, though imperfect, is not destroyed in cases of suppuration of the tympanum, or its partial injury from other causes; hence, as deafness is complete from obstruction of the tube, from no entrance being given to the air, he very rationally supposed that, by making a small puncture in the membrane, in order to allow the air to get access, the machinery of the ear would thus be set in motion.

The experiment confirmed the justice of the idea; and hearing has been preserved in a number of instances in this way, not only by Mr. Cooper, but by myself and others.

The operation is performed by simply passing

the instrument into the meatus, and pushing it through the anterior and inferior part of the membrane of the tympanum, for in this position the manubrium of the malleus will be avoided; a circumstance particularly to be attended to, in order that no part of the machinery may be injured.

Immediately on making the perforation a little crack will be heard by the patient, like the tearing of parchment, from the rapid entrance of air through this narrow aperture. In directing the instrument, care should be taken that it does not penetrate the vascular part of the membrane so as to occasion an effusion of blood; otherwise the success of the operation may be defeated.

When the operation is properly performed, hearing is instantaneously restored: by the perforation a new substitute is made in the small aperture for the Eustachian tube, and the air

being thus admitted into the tympanum, the action of the membrane, and of all the connecting machinery, is in a certain degree re-established.

Some surgeons have performed the operation with a common probe.

In such cases the only danger of a relapse is from a closing of the puncture : to avoid this, a larger perforation may be made ; but then in proportion is the membrane of the tympanum diminished, and consequently the acuteness of the sense of hearing lessened.

The small opening, therefore, is to be preferred, even should a re-union take place. When this happens, it is generally three or four days after the operation, though sometimes I have seen it later.

The most favourable circumstance is when

the sides become fistulous, for then the sense of hearing is certainly saved.

When re-union takes place, the operation requires to be repeated, and there is no danger attending it. In one patient, Mr. Saunders performed it three successive times in a very short period; and then, not wishing to have occasion to repeat it, he made a sort of laceration, which was successful in preserving the opening; but the degree of hearing, he acknowledged, was lessened by this enlargement.

CHAP. IV.

Diseases of the Internal Ear.

The diseases of the Labyrinth, or Internal Ear, may be divided into the constitutional or local, or such as influence it from a morbid condition of the brain, and such as arise from a change in its whole structure.

I. *Constitutional.*

Of all the causes of deafness, that which proceeds from an organic affection of the brain is, of course, the most dangerous. In apoplectic cases, with faultering of speech and blindness,

we find deafness also produced by the general affection of the head. But worst of all is the case where a tumour of the brain compresses the origin of the nerves; for here the deafness is complete, and no impression can be conveyed through the organ to the mind.

A tumour, however, in the vicinity of the organ of hearing, though it runs its course, and proves fatal in the end, has rather a contrary effect; and even while the pupils are dilated, and there is every appearance of pressure on the brain, a morbid acuteness takes place, in consequence of the surrounding inflammation. Indeed, the auditory nerve often becomes acutely sensible in disease, or the patient suffers from acuteness of perception, or has a *tinnitus aurium*, or singing of the ears, analogous to the flashes of light which sometimes affect the eyes in total blindness, and which those experience who are blind of cataract.

So morbidly acute does sensation become in some persons under disease, that the least motion of the head will excite a feeling like the ringing of a great bell close to the ear.

In delirium also, in vertigo, in apoplexy, and in hysteria, the increased sensibility of the organ becomes a painful sensation. In paralytic affections of the face, we find there is deafness in the corresponding ear, if the affection of the nerve be near the brain; which is explained by the intimate connexion between the auditory nerve and the communicating one of the face. From observing the course of the latter nerve through the temporal bone, and its connexion in the tympanum, we know why, in violent tooth-ache, and in *tic douloureux*, we find the Eustachian tube and root of the tongue affected.

The ear is also sometimes affected by sympathy, from foulness of stomach and bowels;

and the same reason may be assigned for the symptom of hypochondriasis—that they are affected with strange sounds, and in the case of intestinal worms, we find murmuring and ringing of the ears a symptom.

Of the organic diseases of the ear there is little to be found on record. It would seem, at times, that the fluids become so altered in their consistence as to prove an absolute destruction of the organ, and frequently a cause of deafness: the whole internal ear has been found at times filled with a substance like cheese.

A disease also of the auditory nerve, like that of the retina, or optic nerve, in the gutta serena, is no unfrequent complaint; and in several cases lately, I have treated it as amaurosis, with considerable success.

Deafness in acute fever is considered a favourable sign; as it argues, according to the old

theory, a metastasis or translation of the morbific matter; or rather, according to modern opinion, it shews a diminution of morbid sensibility of the brain. The accumulation of the vessels of the brain, or of those surrounding the auditory nerve, will also produce deafness, and unusual sensations of the ear. This we find instanced in suppression of the menses, and in hæmorrhoids, surfeits, &c.; in which cases it is found preceded by vertigo and head-ache.

In comparing the diseases of the ear and the eye, we find a considerable analogy subsisting between them; but in those of the eye there is one advantage, that the transparency of its humours is a leading mark to direct us, which we do not possess in the case of the ear: but in judging of the diseases of the internal ear, we should always endeavour to determine, whether it is in the seat of sense or in the brain that the real affection lies; otherwise our attempts to relieve will be ineffectual.

II. *Local.*

From the constitutional diseases of the internal ear I next proceed to examine the local; and, however varied the change of structure on which they may depend, they have all been comprehended and treated under the vague, and, perhaps, too general term of nervous deafness.

The general symptoms by which this species of deafness is distinguished are, various kinds of noises affecting the head, and communicated from the seat of the organ.

At times, these noises seem somewhat to resemble the murmuring of water; at other times, they may be compared to the hissing of a tea-kettle as it boils over: on other occasions, they are represented by the patient as like the rustling of leaves, the blowing of wind, &c.: all these noises are to be considered as false

perceptions in the organ, not arising in the nerve itself, but in the condition of the parts about it.

There is a particular species of this deafness which represents a beating noise, like a pulse; this noise is much increased by any bodily exertion occasioning an increased action of the heart. The cause of this species clearly depends on an irritation of the arterial system; but whether depending on the small arteries of the labyrinth, or on the internal carotid artery, which passes close beneath the cochlea, is uncertain; but whichever of these may be the cause, it gives rise to the same false perceptions as in the other species.

All species then of nervous deafness may be considered as peculiar modifications of constitutional disease, affecting the nervous system in general, and connected with that state which constitutes the hypochondriac and hysterial

habit. The general morbid disposition is here extended to a particular sense, and by viewing it in this light the change of the constitutional affection must form the basis of the cure. It is by considering it in this just point of view that proper principles of treatment can only be adopted, and that much may be done to remove this species of the complaint. The hysterial spasm of the throat and primæ viæ becomes naturally, from the connexion and sympathy of nerves communicated to those of the ear, and deafness in most cases is a never failing symptom with hysterical patients. In the same manner that torpor of the stomach and primæ viæ, so characteristic of hypochondriasis, occasions a dull sensation and torpor of the auditory nerve, and produces that noise and confused impression so often complained of in hypochondriasis.

A wide field, therefore, opens here for new principles of treatment, by attacking the constitutional cause, and that much relief may be

obtained by the application of constitutional means, experience daily evinces. It is from not keeping that analogy in view that nervous deafness is so formidable to most surgeons.

In all cases of this nervous deafness, when it affects one ear, I may observe, it is in general rendered worse by the conduct of the patient himself; for when the organ of one side is injured, we hear so much better with the other, that we only attend to the sensation conveyed by it, and neglect the duller sensation. The effect of this is, that the diseased ear becomes worse, and the same consequence arises as that which takes place in the eyes by squinting.

In attending to the treatment of nervous deafness, if the practitioner is early applied to, and the disease is still in its first stage, it may be considered in general as curable; and even cases of long standing, when properly treated, admit of considerable relief.

In entering upon the treatment of nervous deafness, it is essential to observe, that a great similarity exists between it and that species which arises from a syphilitic cause. In nervous deafness, therefore, it is proper to inquire minutely into the history of the case, and to ascertain from what source the disease originates.

Several cases of nervous deafness, proceeding from the latter cause, have come under my care, which yielded to a regular course of mercury, and the function of the organ was in all completely restored.

Again, where the connexion of the disease with the above cause is not so clear, instead of the treatment prescribed, a strict antiphlogistic course, if the patient be able to bear it, will often prove successful; namely, powerful saline cathartics, of which the best is the vitriolated magnesia: the doses should be repeated as

often as the strength of the patient will admit; and in the intermediate time small doses of the submuriate of mercury are to be administered, to promote absorption, by taking off any thickening of the parts, which is apt to impede the due performance of the functions of the organ.

This practice will in incipient cases succeed: and, if not completely, will at least palliate the predominant symptom; and in all cases it ought to have a fair trial, for deafness should never *à priori* be considered as incurable.

At the same time, it must be confessed that the diseases of the internal ear are involved in much obscurity. Dissections have proved that a total deafness may exist without any apparent defect in the mechanism, either of the external or internal ear.

This has been shown by the dissection of

several cases of persons who had been deaf during life. On examination of these cases, every part appeared perfect; even the nerve and its expansion showed no trace of morbid change; and the alteration, whatever it was, was too minute for either the knife or the eye to detect: it consisted, perhaps, in an original want of power in the nerve to receive impressions. This is equally another proof of its connection with hysteria and hypochondriasis, where the nervous system is in part affected, as is too often observable.

But though I have stated that nervous deafness in its first stage is generally curable, much will depend on the time the treatment is continued, and on the perseverance of the patient and the practitioner.

In some instances a cure has been accomplished in a very short period; in others I have

found it necessary to persevere for a considerable time, and recovery at last has taken place.

With respect to the application of topical remedies to the ear, gentle stimulants, in form of liniment, as a portion of the essential oils mixed with the oil of almonds, may be beneficially introduced into the ear, where, being retained, they will serve as a substitute for the natural secretion, and at the same time increase the sensibility of the passage.

All the advertised nostrums are preparations of this kind; and, so far as they supply the secretion, and gently stimulate the passage, in some cases they may be useful: but as to the notion that they are to remove an organic affection of the part, the various species of which I have described, it only shows the complete ignorance of those who expect success from such inadequate means of relief.

As I have stated, that there is so little to be done by medicine in confirmed cases of deafness of long standing, arising from imperfect organization of the ear, I have with much pains collected a variety of contrivances to assist hearing, many of which I have obtained from the Continent, in order to give all possible relief in such distressing cases.

The newest inventions of this kind, are the artificial ears lately introduced into this country from France, where they were originally manufactured.

By being closely adapted to the ear, they increase the collection of sound; but besides that, there is an additional force wanted to transmit it through the passage. In this respect, the French invention is deficient: to remedy its defect, I have added a small tube, which, by contracting the passage, will occasion the sound to enter with greater impetus. This

invention is found very convenient, in consequence of the substitutes being applied over the natural ear, which they are made to resemble.

The Spanish ears also, made of shells, answer very well: but, at the same time, I must remark, that these mechanical contrivances, although found to be more serviceable than any thing of the kind in general use, yet do not apply with equal success in all cases; and there are, in fact, cases in which no mechanical contrivance can be of use.

With some patients the German silver ears answer better than any others; but are objected to by many, on account of their weight, and being more conspicuous than the French ears; it also being necessary that they should be fixed by a spring, which goes over the head.

The French ears, being made of a light sub-

stance, where they answer the purpose, are generally preferred.

I have also invented a hearing-trumpet, forming a parabolic conoid, on the same principle as the speaking-trumpet used at sea, which is so well known to answer the purpose in extending the impression of sound. It has this convenience, that it shuts up in a small case for the pocket.

CONCLUSION.

I HAVE thus traced, in the preceding pages, the various diseases of the Ear, and laid down the general principles of cure, best adapted to each: but it is to be observed, with regret, that few attempts have yet been made by anatomists to trace the morbid changes or affections to which the ear is liable. On this subject we are almost destitute of information, while the diseased appearances of all the other organs of the body have been traced with great minuteness and attention, have been accurately examined and ascertained, and the symptoms which accompany them recorded with precision and care.

But here, it must be confessed, there are many and great difficulties to obstruct our inquiries; indeed, some of them would appear at first sight almost insurmountable. Nature, as we have seen, has placed the chief and most important part of the ear, in the living subject, beyond the reach of our examination; while, its diseases being rarely mortal, the ears are seldom dissected in ascertaining the causes of death.

The few, therefore, who have applied themselves to the subject of the elucidation of the morbid structure of the ear, have been obliged to dissect such ears as came by chance in their way, without knowing any thing of the previous history of the person to whom they belonged, or the symptoms under which he laboured.

Thus, even though dissection may show the various morbid changes of the structure, the

assistance of anatomy is still highly imperfect, in so far as these changes are not accompanied with a knowledge of the symptoms which distinguished them during the life of the patient.

To the above difficulty, a further one may be added, peculiar to this class of diseases, namely, that a clear and distinct account of the feelings can scarcely be expected from a deaf person, and is seldom obtained.

Though conscious of their imperfection, such persons are not aware of the numerous causes from which they may arise. The approach of deafness, also, is often slow and imperceptible, and unattended with pain, or other strong sensation, to mark its commencement.

Hence few strong impressions are made by it on the mind of the patient for a time, to awaken him to the approaching infirmity; and he loses the faculty of the organ so imper-

ceptibly, that his friends often perceive it before he does himself.

It is from these difficulties, which have been met with by surgeons and anatomists in their attempts, that the subject of the ear has been so much neglected. But I am inclined to think, that the constant dissection of diseased ears, accompanied by due zeal and attentive research, will lead to much useful information; and comparing the symptoms observable during the patient's life, as often as that can be done, with the appearances of the ear on dissection, will enable us to trace cause and effect; and by so doing, adequate means of relief will often come to be discovered.

But though our knowledge may be thus enlarged in respect to the history and appearances of the diseases of the ear, we shall, perhaps, be often disappointed of success in attempting a cure. This cannot be otherwise, when we

reflect, that of the diseases of the ear, one-third is confined to the labyrinth, or internal ear; and as this part is totally inaccessible, no manual assistance can be rendered.

But though the aid of surgery is thus precluded, other secondary means may still be resorted to. Internal remedies are capable of producing changes of a salutary nature, in a great number of local diseases, particularly in those organic affections, whose nature is known and discriminated.

The diseases of the ear, as I before observed, are often constitutional; and the general treatment of the constitution will therefore influence the malady of the particular part. Thus syphilis, in its constitutional form and ultimate stage, attacks the ear, and deafness is produced by this specific cause.

The same course of medicines that remove

the other constitutional symptoms, has an equal effect on this organ ; and if there are no other constitutional symptoms but deafness, then employing internal medicines, according to the regular method observed in the treatment of this disease, will remove the complaint.

Deafness is often the attendant of a cold, or inflammatory state of habit ; in this state, purging, or aperient remedies, properly administered, will be successful.

Various other instances might be adduced, all tending to shew that there are different morbid changes of this organ, as well as of the others, which are curable by a general treatment acting upon the constitution, and thus indirectly affecting the part.

Nay, even the most difficult of the whole of this class of diseases, that which is termed

nervous deafness, may, as we find in its first stage, be arrested in its progress, and thus rendered curable, if the proper analogy between it and other nervous diseases depending on constitutional habit be kept in view.

And it may be considered, that while, on the one hand, there are many and great difficulties, which present themselves in the prosecution of our subject, on the other hand, there are some advantages to counterbalance these, and to prompt us forward in our exertions.

In concluding the present Work, therefore, I must again be allowed to urge, that though much may be done to give relief in diseases of the ear, much still remains to be learned in this branch of practice.

As a leading step to this, and that theory and practice may go hand in hand, I have succeeded, with the assistance and patronage of some

of the first persons in rank, science, and professional celebrity, in instituting a Public Dispensary for the Diseases of the Ear; where considerable numbers have been cured, and where pupils have the fullest opportunities of examining the different diseases of the organ, of marking the success of their treatment, and of judging of the issue of any new plans that may be proposed, either by myself, or from the suggestion of others; several eminent professional characters having kindly offered their assistance at the Dispensary.

From the success which has attended my exertions in this neglected branch of practice, others have been induced to direct their attention to it, and it is to be hoped that such extended investigation of the subject will, in a few years, place it in the same improved state as the other branches of medicine and surgery; for, in my opinion, had the late Mr. Saunders,

whose modes of practice I highly approve and am endeavouring to follow up, confined himself to the exclusive treatment of the ear, instead of the different branches of surgery, the result of his labours would have been of the highest benefit to society at large.

CASES.

CASE I.

Mrs. W. applied to me, under a violent inflammation of both ears, attended with much pain and fever.

After taking a few ounces of blood from the vicinity of the parts, and applying warm fomentations, the symptoms gradually subsided. It may be remarked, that her hearing was not much effected, although she could not hear sounds distinctly. By the use of laxative medicines, at the same time adopting an antiphlogistic plan, she is now perfectly recovered.

CASE. II.

Miss B. applied to me with an herpetic eruption of both ears, which she had been subject to at different times for the last five years. By taking the Compound Calomel Pill regularly every night, for about a month, and anointing the external part of the ear with an ointment made of equal parts of the Nitrated Mercurial Ointment and Hog's Lard, she is now perfectly well. It was, however, necessary to order her an astringent injection, which was continued for the space of ten days.

CASE III.

Miss L. complained of an ulcer which covered the whole of her left ear. It was not attended with a puriform discharge from the tympanum; but merely the external part was diseased. As the ulcer had been of long stand-

ing, I was fearful that she would lose her ear, as she appeared of a scrofulous habit. After continuing the use of an alterative medicine for near a month, and applying the Ointment of Zinc to the parts affected night and morning, they began to put on a better appearance. But in order to hasten the cure, I found it necessary to substitute the Nitrated Mercurial Ointment, mixed with Hog's Lard; which, in the course of a month from her first application, completely restored her.

The ulcer, however, left a slight scar; but was not very observable.

CASE IV.

Mr. C. applied to me with a puriform discharge from the tympanum, which had continued for some time. As it was in its first stage, it yielded to a single astringent injection of the Sulphate of Zinc.

CASE V.

Col. W. applied to me in consequence of a puriform discharge of the tympanum. On inspecting the tympanum, I found it injured; as air could be blown out of the meatus. By observing a strict antiphlogistic regimen, using an injection of the Sulphate of Zinc, and taking an alterative for six weeks, the discharge was suppressed, and the hearing restored.

CASE VI.

Mrs. N. applied to me in consequence of a large polypus which came out of the meatus. It appeared after a puriform discharge from the tympanum. For some time air had passed out of the meatus, on blowing the nose: this symptom had ceased about the time the excrescence was first observed. I succeeded in extracting

the polypus, which came out entire. After dressing for a short time with the Red Nitrated Mercurial Ointment, the parts to which the polypus adhered healed. I conceived it necessary to adopt the alterative and purgative plan, which was carried on for about a month; at the expiration of which time she was quite well.

CASE VII.

Miss W. was sent to me with a polypus in her left ear, attended with a puriform discharge from the tympanum; which had impeded her hearing so much, that her friends took her from school. On inquiry I learned, that she had had the discharge for some time. I extracted the polypus with a pair of small forceps; but was not able to bring it away entire. I afterwards pinched the roots, and applied the Argentum Nitratum, as recommended by Mr. Saunders.

I found it necessary to order an astringent injection, which, being used for some little time, succeeded in suppressing the discharge. As she was a girl of a delicate constitution, I administered the Bark, joined with a chalybeate. Her hearing is not only restored, but her general health also considerably improved.

CASE VIII.

Mr. L. had been subject to a puriform discharge from both ears, which had troubled him, more or less, for several years. The discharge, when he first applied to me, was very considerable, and was extremely offensive; it was occasionally mixed with blood; and such was its acrimony, that the ear and neck were excoriated by it.

Observing my usual plan of not stopping the discharge hastily by the use of astringent injec-

tions, for fear of producing an inflammation of the brain, a caution necessary to be attended to in the treatment of diseases of this nature, I prescribed, for some few weeks, small doses of the Submuriate of Mercury, and twice a week some purgative medicine. After following this plan for about ten days, and having blisters applied behind the ears, I ordered him an injection of the Nitrated Silver, which he used night and morning for a month; at the expiration of which time the discharge was suppressed, and the hearing restored.

CASE IX.

Mr. D., aged thirty-two, had been deaf of the left ear from his childhood. On inspection, I found it perfectly sound. The fault evidently lay in a deficiency of the natural secretion: by restoring this, by means of proper applications, and by observing for some little time a strict

phlogistic regimen, so perfectly has his hearing been restored, that he can hear the tick of a watch at the distance of four yards; which before he could not do unless held in direct contact with the ear.

CASE X.

Peter Oliver was recommended as a patient to the Royal Dispensary. He had been deaf nearly four years when he was admitted. As I found it was a nervous affection, I applied blisters behind both ears, put him on an antiphlogistic plan, gave him small doses of Submuriate of Mercury, and occasionally a brisk dose of the Vitriolated Magnesia. In the space of five weeks he was perfectly well.

CASE XI.

David Voir, a lad nine years of age, was admitted a patient of the Royal Dispensary on the 21st of March, 1817. He was a very delicate boy, and laboured under great difficulty of hearing. I treated this case in a similar manner to the former. The blisters behind his ears were kept open for a fortnight, and it was ten days before he found any considerable relief. He continued the use of the alterative and cathartic medicines for some time; which, although they relieved his hearing, reduced him more than I wished. I put him on a strengthening diet, and administered the Bark in small doses. He has now perfectly recovered his strength, together with his hearing, and is altogether much better in his health than formerly.

CASE XII.

George Dawson, aged twenty-two years, was admitted a patient for an obstinate nervous deafness, at the Royal Dispensary on the 28th of March. On inquiry, I found he had been deaf several years; and upon inspection, I found his ears quite dry, wanting the natural secretion: he complained of the noises in his head, frequently attending nervous deafness, which at times prevented him from following his employment. As he was a robust man, and of a plethoric habit, and was very desirous of obtaining his hearing, I took twelve ounces of blood from his arm, put a seton in the nape of his neck, and applied a blister behind each ear, which were kept open for a fortnight: he took five grains of the Submuriate of Mercury every night, and an ounce and a half of the Sulphate of Magnesia, twice a week; at the same time adopting a strict antiphlogistic regimen. He persevered in the use of his medicines for a short

time. As he was reduced, I ordered him the Bark. He was discharged on the 6th of May. I have seen him since the seton has healed, which it had not when he was discharged. He continues quite well, having his perfect hearing, and is not troubled with any noise whatever in his head.

CASE XIII.

Mr. —— applied to me; his case was similar to the preceding one. I pursued the same plan, only in a milder degree. The blisters were applied; and not having the desired effect, I had recourse to the seton, which was kept open a month. The parts are now healed, and his hearing is perfectly restored.

CASE XIV.

Mr. N., a gentleman resident in Ireland, wrote to me respecting his case; which, from

what I could learn, appeared to be a nervous affection; for, besides being very deaf, his head was much affected with strange noises, which at times made him melancholy.

I prescribed nearly the same mode of treatment as in the preceding case, at the same time ordering him to lose six ounces of blood from the nape of the neck, in case the medicine and antiphlogistic plan did not relieve him. I heard from him a short time since, to the purport that his hearing is much improved, and the noise in his head considerably abated.

His brother has since called on me, to acquaint me he is now quite well.

CASE XV.

Capt. D. applied to me with a considerable polypus of the left ear, which had troubled him

for several years: it was attended with a profuse discharge. As he had a great dislike to any operation, I had recourse to the ligature, as recommended in a former part of this work, and by passing the ligature with a probe to the bottom of the fungus, I succeeded in tying it, thereby stopping the circulation of the vessels. In a short time the polypus came entirely away, but as there was still a discharge, I had recourse to an injection of the Sulphate of Copper, which suppressed the discharge, and his hearing is most completely restored.

CASE XVI.

Amelia Stubbs, aged eighteen years, had been troubled with an obstinate nervous deafness for twelve years, without having obtained any relief. She applied at the Royal Dispensary on the 22d of September, and in about six weeks was discharged perfectly cured,

by the method I have so repeatedly laid down, and so successfully adopted.

CASE XVII.

William Hill was admitted a patient at the Royal Dispensary on the 12th of June. His case is rather singular, having been born in the open air, as his mother was passing a common in coming from an entertainment. He informed me he had been deaf from his birth. By the usual means employed, he has perfectly obtained his hearing.

CASE XVIII.

Sarah Green, five years of age, was brought by her mother to the Royal Dispensary on the 3d day of May. The child appeared very deaf, and of a listless aspect; by her mother's account she passed restless nights, gnashed her teeth during sleep; appetite various, at one

time indifferent, at another voracious. The child's appearance was sickly, the eye languid and heavy, countenance pale, and the upper lip somewhat tumified; the bowels were irregular, and the stools dark and offensive.

Suspecting from the deranged state of the digestive functions, that the deafness might be sympathetic of this affection, I felt inclined to try the effect of gentle emetics, repeated twice a week, with doses of calomel intervening. I shortly had the satisfaction to find the stools become less fœtid, the appetite more natural, and the general health and appearance of the child to improve; as these changes for the better took place, a corresponding alteration in the local affection of the ear accompanied these salutary and flattering changes in the constitution. In short, with a restoration to good health, there was also a complete recovery of the sense of hearing. No worms were observed to pass by stool, and the child remains perfectly well.

CASE XIX.

In about a week after the last case was dismissed cured, Master Macnamara, a fine boy, about nine years of age, was brought to my house, labouring under similar symptoms. From the efficacy of emetics in the case of Sarah Green I had recourse to them in this; and without detailing the symptoms at length, and the progressive and simultaneous disappearance of the disorder of the system and the sympathetic affection of the ear, suffice it that their use appeared equally appropriate, and their effect was equally beneficial.

CASE XX.

Master ——, the son of a worthy Baronet, was exceedingly deaf when brought to me. He too was of a pale complexion and languid appearance, ground his teeth when asleep, and

often when awake picked his nose; his bowels and appetite were irregular, stools fœtid and dark-coloured, belly hard and tumid, and frequently he complained of griping pains about the umbilicus.

Emetics were had recourse to without effect, but as the symptoms of worms were unequivocal, he was put on a course of strong anthelmintics, and vermes of the lumbrici kind were passed in abundance. The general health shortly after this improved daily, and what proves that the hearing was affected sympathetically, was the restoration of this sense on the other complaints being got rid of.

No topical means were applied in these cases, but the cure was wholly effected by having detected and remedied the remote, yet indubitable source of the deafness.

CASE XXI.

Susan Vaughan was admitted a patient of the Royal Dispensary on the 6th of September. She complained of a violent pain in her left ear, which annoyed her exceedingly: the meatus auditorius appeared considerably enlarged. By continuing the use of a stimulating liniment by means of a bougie, she was surprised one morning to find a worm, nearly two inches long, come from her ear; and by continuing the use of the application, in the course of a week a second was ejected, leaving a discharge, which yielded in a little time to an astringent injection. Her hearing is now perfectly recovered.

CASE XXII.

Robert Cartwright had been deaf nine years when admitted a patient at the Royal Dispensary: his deafness at the same time was

attended with a puriform discharge from the tympanum. By adopting the plan already recommended, he is now quite well.

CASE XXIII.

Mr. Y. applied to me with a most obstinate case of nervous deafness, as he expressed himself, for which he had tried a variety of means to obtain relief; and being a medical man he had consulted most of his acquaintance. As I considered it a good case for the new mode of practice I mentioned in a former part of this work, I began by excluding the external air from the meatus, which was continued for some days; at the expiration of a month he lost the violent noise in his head, which had so much distressed him, and in a fortnight after this by continuing the plan his hearing returned.

The number of cases of incipient nervous deafness, which I have successfully treated, only convinces me, that if early attended to, they are more easy of cure than is generally imagined.

CASE XXIV.

Mr. Y., a young man twenty-seven years of age, applied to me with an obstruction of the Eustachian tube, which, from what he informed me, I was induced to think proceeded from a syphilitic cause. After using a stimulating gargle for some time without effect, I was induced to perform the operation of puncturing the tympanum, which succeeded instantly in restoring his hearing; but I had some difficulty in preventing the aperture from again uniting. The edges of the wound became fistulous, and in a few weeks the membrane recovered its usual tension; and his hearing is now restored.

It may be proper to remark here, that in slight cases of obstruction of the Eustachian tube, I have found a slight stimulating gargle of the greatest service, and in my opinion it deserves a trial in cases that are supposed to proceed from this cause; as the remedy is simple, its application cannot be attended with any unpleasant effect. It may, indeed, make the throat a little sore; but that soon goes off.

An obstruction may proceed from various causes, as I mentioned in a former part of the Work; but the most frequent cause is a cold, when the orifice of the tube becomes swollen: in that case a gargle is of great service.

CASE XXV.

Mr. W. came to me with an unusual sensation of both ears, which he had laboured under for some years. On inspection, I perceived

there was a quantity of cerumen in a very hard state, collected at the bottom of the meatus. By continuing to syringe the ears, the whole was removed. On the first application of the syringe, which brought away a considerable quantity, he was able to hear the church clock strike, which he had not done for several years before. What makes this case rather singular, is, that this gentleman conceived he laboured under a violent nervous affection, and came to me for the purpose of obtaining a trumpet; which not answering his expectations, I prevailed on him to let me examine the state of his ears. I need not mention that he was much pleased at being relieved by such simple means.

Many other cases of a similar nature have come under my observation; all which point out the necessity of minute examination, in order to ascertain the cause of the defect, before offering any decided opinion.

In the dissection of the ears of those who have been deaf for many years, whatever other derangement of structure may exist, there is always a quantity of inspissated wax in the passage, in a very hard state, as formerly mentioned; which shews, that a morbid condition of the organ necessarily affects the secretion of this part, and that the secretion itself accumulated in this way may act as an additional mechanical cause in increasing the obstruction of hearing.

CASE XXVI.

Thomas Hamilton, a boy seven years of age, was brought by his mother to the Royal Dispensary. She informed me he had been both deaf and dumb from his birth. Although I did not give her any considerable hopes of cure, I was desirous of attempting relief. I accordingly employed the same mode of treatment as I have recommended in cases of nervous deafness;

having, however, previously ordered the ears to be well syringed. He was admitted on the 22d of April, 1817; and since that time his hearing has been regularly improving, and he has also acquired the faculty of speech.

CASE XXVII.

Miss B., aged fifteen years, had been from her birth deaf and dumb, and when she was first brought to my house, she could neither hear nor articulate a word. Being the daughter of wealthy parents her education had been well attended to, for she could write remarkably well, and play on the piano forte. This case I treated in a similar manner to the preceding ones: with the assistance of excluding the external air from the meatus, at the same time exciting a slight degree of inflammation at the bottom of it, my success was here equal, for the young lady can now hear and speak.

CASE XXVIII.

Charles Vernon, aged twenty-eight years, was admitted a patient at the Royal Dispensary on the 24th of April, at the recommendation of a Royal Physician. On enquiry, I found he was deaf and dumb, and that he had been four years in the Deaf and Dumb Asylum in the Kent-road. As I was desirous of attempting relief, I employed the same means as in the preceding case, and not without considerable effect; for in the course of a short time he was able to hear sounds distinctly. I regret that I had not an opportunity of following up the plan I had laid down, and which was pursued with so much apparent advantage, as he went to Scotland to superintend his brother's business, he being an excellent mechanic, content with, and grateful for, the benefit he had already received.

CASE XXIX.

Miss W., a very interesting young lady, was brought to me by her mother, who informed me that she had been deaf and dumb from birth. By adopting local remedies and constitutional treatment, I have the satisfaction to find that she hears sounds, such as a clock strike, a dog bark, &c. which she did not do before; and by steadily following the plan of cure which I prescribed, her medical attendant and I concur in the well founded expectation that she will shortly obtain her perfect hearing.

Several cases have occurred to me in my practice, where children have been very backward in acquiring their speech, which I had every reason to suppose proceeded from deafness; for having had the ears syringed, and employing the means already detailed, a visible alteration soon took place, and they began to

learn to talk very fast. In the same manner I am inclined to think that if every child who is supposed to be born deaf and dumb, were to have the ears *properly examined* and syringed, it would be frequently attended with very good effect, and these imperfections in many cases removed.

I have no doubt that frequently in childhood, for want of something being done by way of relief, the deafness becomes confirmed, and dumbness follows. The plan I have proposed in such cases is simple, and is not attended with any danger: I therefore hope it will be followed by all who have deaf children.

I shall not tire the reader with a recital of any more cases: the few I have inserted will be sufficient to show, that diseases of the ear, like diseases of other parts of the body, are often curable, and that, in a great number of cases, the hearing is only impaired, not lost; hence

the necessity of attending to them. Although, it must be confessed, many are involved in great obscurity, yet that number is small, when compared with those in which, with attention, the cause of disease may be discovered, and a cure effected.

FINIS.

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ERRATA.

Page 53, line 16, for ceruix *read* cervix.

56, — 14, for solven *read* solvent.

74, — 4, for training *read* tracing.

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